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The Line of Least Resistance

In these days of labor scarcity one hears a great deal about the inefficiency of labor—the men are indifferent about their work, exceedingly independent and they cannot be driven. If the work does not suit them they will go elsewhere. There is no denying that these characterizations are thoroughly accurate, but is there not too much of a tendency to accept this state of affairs as a justification for even more inefficiency on the part of the foremen? To illustrate: A railway carpenter foreman, whose men were presumably at work at some repairs in the waiting room of a passenger station, took occasion to comment on the high caliber of the men in his gang. "These are all high grade men who can get jobs elsewhere at more money," he said. "It is only because of my personality that they stay with me." "Personality" in this case apparently consisted in allowing the men to do exactly as they pleased, for a more artistic example of plain and fancy loafing was never exhibited. It is conceded that the maintenance of way foreman and his superiors are confronted with no ordinary problem in their efforts to get work out of men who could obtain better pay elsewhere if they were not too lazy to work hard. But surely this does not justify the self-comforting attitude taken by the foreman in the example cited. The habit of mind engendered in both the men and the foremen after five years of labor shortage is one that it is difficult to overcome, but the work must be done and it may be that a gang of four men will accomplish more work after one of the men has been fired. It is true that any form of employment must possess certain attributes of attractiveness if men are to be recruited and retained, but no employer can afford to carry on any undertaking that is attractive to workmen solely because they are not compelled to work. If this is the case with railroad employment it is time to make some radical changes.

New Conditions Beget New Methods

The times in which we have lived since August, 1914, have been replete with kaleidoscopic transformations. What was true yesterday no longer prevails today. Cost data in particular have rapidly become obsolete and relationships established by comparative costs likewise are rapidly vitiated. Thus as a result of slow deliveries and increased costs of lumber, certain localities have experienced a revival of concrete block construction. This type of building material was largely discredited about 10 years ago because of the narrow limits on the opportunities for satisfactory architectural treatment. This condition was aggravated to a considerable extent by the misguided attempts at external embellishment practiced by the small town builders. The present use of this building material overcomes this objection since it implies the use of the blocks for purely structural purposes, the walls being finished by a coating of stucco applied directly to the block surface without the use of furring strips or lath. Under price relationships formerly obtaining, this form of construction was more expensive than stucco on ordinary timber frame construction, but under the prices now prevailing in certain localities the concrete-block-stucco con-

struction becomes more economical. No doubt these conditions do not apply universally, and are cited here purely as an illustration. The lesson to be learned from this is that any plans for the construction of small railroad buildings such as are ordinarily built by the maintenance forces should be carefully investigated with a view to ascertaining what type of construction is most economical under present prices.

PROGRESS IN THE STUDY OF STRESSES IN TRACK

FROM THE STANDPOINT of a track structure, its development and maintenance, a most important scientific work is being conducted by the Joint Committee on Stresses in Track, an organization consisting largely of railway men selected from the membership of the American Railway Engineering Association and the American Society of Civil Engineers to make a scientific study of the action that takes place in the track under traffic. The committee is headed by Professor A. N. Talbot of the University of Illinois and much of the work has been carried on by the experimental staff of that school. The work has been in progress since March, 1914, and the first progress report was given out in the spring of 1918. This was largely preliminary in character and was limited to the determination of a theoretical analysis and the reports of some tests made to determine the stresses in rails for engines standing still on the tracks and also moving at various speeds. Some facts were also presented on the effect of the general condition of the track, particularly its state of upkeep, on the stresses set up in the rail and some valuable information was developed on the effect on the track of various arrangements of the locomotive wheels. Thus it was shown that the trailer wheels produced a much more pronounced effect in proportion to the loads they carried than did the drivers.

This year the committee presented a second report, which has been published in the proceedings of the American Society of Civil Engineers for February, 1920, and in Bulletin 224 of the American Railway Engineering Association. While this second report greatly amplifies the material presented in the earlier paper, the information is still in such shape that it is still of but limited value to the practical trackman. Many important basic facts, however, have been determined and there is much of promise in the future work of the committee.

This second report is devoted in large part to a study of the effect of speeds of locomotive on the stresses in the rail, but differing from the earlier work in distinguishing between the effect of the speed alone and that arising from the counterweights or rather overbalancing provided to cut down the nosing effect of the reciprocating pistons, piston rods and main rods. This investigation brought out the startling fact that these counterbalances at high speed may produce effects on the rails 100 per cent greater than that from the dead weight of the drivers alone. The report shows very definitely that the designing of locomotives should be done with a much greater regard for the effect which the locomotives will have on the track than was deemed necessary in the past.

Considerable experimentation was also carried out with respect to the action of the tie under load—where the greatest pressure existed between the tie and the ballast, where the bending stress in the tie is the greatest, the effect of tamping, the kind of ballast, etc. Apparently, the investigations on this phase of the subject that have been made thus far are not sufficiently complete to enable the committee to formulate any general principles, but the matter presented would indicate that more experiments would tend to show how the track could be best improved, whether the ties should be made longer, or wider, whether there would be advantage of using more of them to the rail length, where the tamping should be done with different kinds of ballast and under varying circumstances to get the best results, etc.

The committee also reported on experiments made to determine how deep the ballast must be to distribute the tie loads uniformly over the roadbed surface. These experiments were not made on actual track, but on a laboratory basis, using three full size ties, spaced the normal distance apart, and carrying two rails spiked in place to standard gage. This track section was placed on various kinds and depths of ballast on a concrete slab and loaded with a superimposed jacking rig. The pressure which this ballast imposed on the slab was determined by distributing so-called pressure capsules over the surface of the slab. As a result of these tests, certain general observations have been made by the committee which are published in full on another page of this issue.

The study of stresses in track can never be made an exact science. The conditions are entirely too variable. It is for this reason that the work done by the committee thus far, the reports of which cover some 350 pages of text and diagrams, has as yet resulted in the formulation of but very few facts of direct, practical application. However, this is no reason for disparaging the work which the committee has done or will do in the future. It will be necessary to make tests under a great variety of conditions before specific rules may be drawn. That the progress which the committee has made thus far has inspired the confidence of the higher officers of the railroads is demonstrated by the appropriation of $18,000 made by the American Railroad Association to continue this work for the next two years.

HOW CAN EFFICIENCY BE RESTORED?

THE ROADS are now back in the hands of their owners, somewhat the worse for wear, but back nevertheless. However, they are not the same roads in many respects that they were when Uncle Sam took charge of them, as maintenance officers are rapidly realizing. While under his care numerous changes in practices were made which are adding greatly to the difficulty of conducting the work of this department. Typical of these are the introduction of the eight-hour day with time and one-half beyond that period; the adoption of uniform working conditions; the almost universal organization of employees, and numerous other developments, none of which were designed to increase the efficiency with which the work is conducted. The result is that the maintenance of way officer now finds he is confronted with the work of overcoming the deterioration of the past two or three years with greatly increased costs for labor and material, with a more or less shattered organization, and bound by seniority rules and other regulations so numerous as seriously to limit his ability to handle his work with any degree of efficiency.

More serious than any other development is the change in attitude of labor. Not only is the morale lower than in any previous period, but the general attitude of the men has changed. The natural accompaniment of such a transition is a greatly decreased output of work per man hour which serves still further to increase greatly the unit cost of the work beyond that brought about by the higher wage rates.

The maintenance officer is confronted with a problem of herculean proportions; the public rightfully demands that the roads be properly maintained; it also expects that this shall be done economically. The manner in which this can be accomplished is a problem demanding

the most serious consideration and the freest interchange of ideas. For this reason we announce a contest on Means of Restoring the Efficiency of Maintenance of Way Department Forces, for which we invite discussions of this general subject, with particular reference to steps which may be taken to increase the output of work or otherwise to improve the performance of this department. Prizes of $25 and $15, respectively, will be paid for the best and second best papers presented, judgment being based upon the practicability and general application of the methods suggested. All other papers accepted and published will be paid for at our regular space rates. Contributions should be sent to the Editor of the *Railway Maintenance Engineer,* Transportation building, Chicago, and must be received not later than May 10 to be considered by the judges. Any manuscript not used for publication will be returned to the writer.

THE SUPERELEVATION OF CURVES

ON OCTOBER 29, 1919, a passenger train on the Southern Pacific was derailed near Vincent, Cal., killing five persons and injuring a large number. At the time of the accident the train was traversing an 8-deg. 10-min. curve, the outer rail of which was elevated 4 in. to 4⅛ in., at a speed variously estimated at from 35 to 45 miles per hour. In its report of the accident the Division of Safety of the Interstate Commerce Commission states that the track was in good condition and attributes the accident to excessive speed for that superelevation. In support of this contention it cites the recommended practice of the American Railway Engineering Association to the effect that the correct theoretical elevation of the outer rail for a curve of that degree and a speed of 40 miles an hour should be 8½ in., and that the maximum speed theoretically allowable for an elevation of 4 in. is slightly over 27 miles per hour. This raises a question of vital importance to trackmen which warrants their most careful consideration.

It is common knowledge that the outer rail of a curve is elevated to overcome the centrifugal force acting upon a train and that the amount of this elevation is dependent on the degree of curvature and the speed of the train. If all trains ran at a uniform speed over any particular curve, the determination of the amount of superelevation which should be provided would be simple, since it is directly dependent upon the speed. However, in practical everyday railway operation trains do not ordinarily run at uniform speeds over any section of the track, for tracks such as the one in question are used by trains moving at widely varying rates of speed, from the slow moving tonnage freight train to the high speed passenger train.. If the elevation is higher than that required by freight trains, the increased resistance adds to the cost of operation of these trains and to the maintenance of the track and equipment. For this reason it is important that the elevation be not higher than that required for safe operation of passenger trains moving at the maximum speeds permitted. This elevation is not the theoretical elevation given by the American Railway Engineering Association, for that elevation is that which will overcome entirely any tendency towards overturning.

In view of the conflicting requirements of these varying classes of traffic, maintenance men are accustomed, and properly so, to strike a practical mean in deciding upon the required elevation. It is therefore important that one be not misled by the conclusions which the commission has drawn from the figures of the American Railway Engineering Association. These figures, as stated above, are the theoretical elevations which are required to overcome *entirely* the tendency of trains to overturn. However, it is not necessary that this result be attained. For instance, it is not practical to provide any elevation in crossovers, and yet trains traverse them regularly at relatively high rates of speed. As a matter of fact, the American Railway Engineering Association also recommends that track elevated three inches less than the theoretical requirement may be considered good practice. Track men cannot afford to take any chances with too little superelevation of curves, but it is neither practical nor necessary to apply the full theoretical elevation as intimated by the commission.

WILL GOOD JUDGMENT PREVAIL?

THE LABOR OUTLOOK is not at all reassuring at the present time. As the supply is not even now equal to the demand in most localities a shortage of the most acute character is certain when general construction work opens up. Prior to federal control the roads competed with other industries for their labor, while they contended even more actively with each other. After the government took over the roads and established standard wage rates and conditions of employment on all railways, the competition was confined to that with outside industries. Now all these restrictions are removed and the roads are free to adopt such measures as they individually see fit. The developments of the next few months will, therefore, be awaited with intense interest.

At the present time there is only a limited supply of labor to be had. Little relief may be expected from foreign countries for some time to come. An increase in the wage rates will not, therefore, increase the supply appreciably. It will only affect its distribution among the industries. The labor employed on railway maintenance is of two classes—that local to the place of employment, recruited from the rural communities, and that secured in the large centers and shipped out to the points of shortage.

Those roads which are located largely in the agricultural areas have not experienced serious difficulty in securing an adequate supply of labor outside of their terminals during the last two years, for the higher wage rates which have been in effect have drawn large numbers of men from the small communities onto the track since wages in these communities have not, in general, risen as rapidly as elsewhere. In the large centers, the reverse has been true and it is here that serious difficulty has been encountered. It is in these places that the universal industrial activity has created a demand for men far in excess of the supply, with the result that those industries most in need of and best able to pay for labor have outbid the others, a contest in which the railways have not been able to engage with any degree of success. Now that the restrictions on individual action by the roads are removed it is to be hoped that they will realize the full limitations of the general labor situation and that they will not therefore resort to their former tactics of bidding against each other, for the industries can and will in general outbid the roads for as much labor as they require, and the only result of such competition on the part of the roads is to attract from one road to another those men who for some reason prefer to remain in railway service. Such action will only demoralize the forces which are already employed.

This is not intended as an argument for low wages under present conditions, but rather for a sane realization of the conditions existing. This is a period when the common interest of all is paramount to the temporary, individual interest of one road. It therefore places every railway maintenance officer on trial, for the ill-advised action of one may lead to the embarrassment of all.

LETTERS TO THE EDITOR

A PLEA FOR MORE ADEQUATE WAGES

Topeka, Kans.

TO THE EDITOR:

I have seen several articles in different railway magazines recently about the present inefficiency of the man in the maintenance of way departmnt, but as yet none of these writers has told just why this condition existed, especially in the bridge and building department. I have been in this department on one road continuously for 20 years and have been a foreman for over 15 years.

When I commenced railroading in 1905 the mechanics in the bridge and building department were drawing as high wages as mechanics in any other department, except machinists, who were drawing from 2 to 3 cents more per hour, and carpenters in the bridge and building department were paid within a few cents per day as much as in the outside industries. At that time one would almost always find all of the bridge and building gangs filled with the best skilled mechanics that could be found anywhere, men who had been in the service for years. The railway companies never had a more loyal set of men than those in the bridge and building department, ready to go to a burn-out or a wash-out any minute of the day or night, in any kind of weather, and work as long as necessary without either rest or sleep. Where two or more gangs worked together the men would work like beavers to get trains over, and each gang would try to see which could get its tasks or allotment of work done first. In most cases this same spirit existed in their regular every day work. I remember one instance where I moved my gang to a water station to rebuild a water tank at the same time that the foreman on the adjoining territory undertook a similar job with the same number of men. After the first few days the men in each gang began to ask the train crews how the other gang was getting along with their tank, and of course the train crews would tell each gang that the other gang was far ahead, thus spurring the men in each gang on to greater effort. But these conditions do not exist today except among a few of the old-timers who remain. There is but one reason for this change. It is the class of men we have to work nowadays on account of the low wages paid in this department compared with those of the other departments and outside industries.

The mechanics in the other departments are drawing from 62 cents to 72 cents per hour, they are furnished practically all the tools they work with, and they are home every night, or if sent away from their regular work they are paid for every hour they are away, together with all their expenses, while in the bridge and building department the highest wages for skilled mechanics and experienced bridge men are 56¾ cents per hour, the men furnish all their carpenter tools themselves, and they are away from home all the time, paying from $1.25 to $2 per day for board.

There is little inducement for a mechanic to work in the bridge and building department any more, except for two or three months during the winter when other work is slack.

A foreman is handicapped on every job he starts, either by being short handed or by his gang being filled with inexperienced men. This class of men is the cause of the number of accidents in the bridge and building department being greater than in other departments. If the accident reports were followed up I will venture to say that at least 75 per cent of the accidents occur with men or are caused by men who had only been in the service a short time.

The remedy for this condition is to pay the mechanics the same wages as are paid to mechanics in the other departments and somewhere near those paid by outside industries. If this is done one will again see the gangs filled with skilled mechanics as in the past, and I will venture to say that the railway companies will get at least double the amount of work for each dollar paid out in wages that they are getting for that dollar today.

B. C. TAYLOR,
Foreman bridge and building gang, C. R. I. & P.

REAL WINTER

Marquette, Mich.

TO THE EDITOR:

The winters are always severe along the line of the Duluth, South Shore & Atlantic and with spring now at hand in most parts of the United States many railroad men may be interested in the record of the past winter on this railroad which runs in a generally east and west direction from Superior, Wis., to Sault Ste. Marie, just south of Lake Superior, with one or two branches, including the Mineral Range Railroad running northward into the Keweenaw peninsula to Calumet, where the winter snowfall is frequently more than 160 inches.

The snowfall at Marquette, Mich., up to March 12 as reported by the weather bureau was 103.8 in. At Calumet it was 154 in. At Duluth the first snow to remain on the ground through the winter fell on November 17. The first below-zero weather was on November 29, 10 deg. below, and there were 37 days of zero weather or below from that date to March 10. The lowest temperature was 37 deg. below. On the Mineral Range Railroad in the copper country the first permanent snow came four days earlier, on November 13. There were 32 days of zero weather and below, with the lowest temperature 24 deg. below.

The snow varied in depth this year, as it always does on the Duluth, South Shore & Atlantic. In cuts it ran from one foot to eight feet deep in the worst places, but in the majority of long, low cuts it ran from three to six feet deep. Conditions on the Mineral Range were much the same.

With winters such as this the snow plows are kept very busy. On the Duluth, South Shore & Atlantic plows were used to the extent of 73 plow days, commencing December 12, 1919. The last trip was made on March 10, 1920. On the Mineral Range the plows were worked for 36 days between December 4 and March 10.

One means we take to avoid extreme trouble after every storm is to keep the wing plows going to widen back the cuts from five to six feet from the rails, while toothed ice cutters are used to clean hard snow and ice from between the rails in yards. For this reason we did not experience much trouble with the last severe storm that came on March 4. At 3:30 p. m. on that day we found we had no connections from east, west or south—everything stuck—so all trains were cancelled for that night. The only train we had out was a freight, which got stuck at Eagle Mills, and the Detroit plow, which left Thomaston at 10 p. m. and arrived at Superior at 7:15 a. m. On the morning of the fifth we got both plows going by 8 a. m. and started all trains out after the plows and got through without any serious trouble, without anything stuck or a wheel off the track. On the Mineral Range we worked snow plows all day on March 4 and snow plows and rotary and crab on March 5 and ran all trains both days with the exception of passenger trains which were cancelled for lack of connections.

ROADMASTER.

HANNIGAN TAKES A CHANCE

BY CHARLES H. SMITH

"IT MUST HAVE been part of an arch bar dragging that caused it," said Foreman Hannigan as he surveyed the broken bell crank on the derail at the west switch at Hatches Siding. "Either that or something else that was dragging caught it. The only thing I can't understand, if it was an arch bar, is why there wasn't a smash-up. A broken arch bar won't run very far usually. The train crew must have found the car and set it out before it ditched them. Anyway," he concluded, "it was something dragging on the outside of the rail that broke this crank."

He glanced at the pipe which connected the derail with the switch and then inspected the "toad on the rail" itself. But except for the broken crank and a slight bend in the pipe the mechanism was in good condition. The crank was broken in two.

"We'll have to disconnect the pipe and take the derail off of the rail," Hannigan continued to his men, "or some brakeman will think that he has thrown it when he hasn't and his train will head over towards the right of way fence. This broken crank will have to be welded or else we'll have to have a new one to replace it. I'll notify the dispatcher that the derail is out of service just as soon as we get to Breckenridge so that he can put out an order about it."

Hannigan and his men were on their way to the car house at Breckenridge and had stopped to fill and light the switch lamps at Hatches Siding, a small flag station near the east end of their territory, when they discovered the broken derail. The siding which it was on is used mostly as an industrial track—an occasional carload of fertilizer, tile or feed being set out on it for the neighboring farmers to unload. On the afternoon that Hannigan discovered the broken derail it was clear of cars. In fact, it is clear most of the time, for Hatches Siding is a prepay station and the amount of business handled there is very small. Quite frequently the local freight and short through freights use it as a passing track. It slopes down slightly towards the west—therefore the derail on the west end of it.

When the men had the pipe disconnected and had removed the derail from the rail they quickly jumped on their motor car and started westward. The unexpected work had delayed them and they would now be late in getting in. They sped over the rails at a lively clip as Hansen, who was running the car, moved the gasoline throttle back notch by notch. The spark was advanced until it gave a maximum of power. The car flew past woods and meadows clad with the fresh green of spring; past farmers plowing and harrowing their fields and over road crossings and culverts. Each man was anxious to get home as soon as possible. Ahead of them the track curved sharply through a deep cut and then went straight into Breckenridge, a distance of two miles.

As they approached the cut Hannigan glanced at Hansen and seemed about to speak, but he said nothing. Without diminishing its speed the car hit the elevation of the curve and started to round it rapidly. They were almost half way around when suddenly over the top of the hill ahead of them a black plume of smoke and steam shot into the air—a train was coming close. "Look out!" shouted the foreman. "Train coming!" There was no need of his warning, however, for Hansen had already cut off the spark and the gasoline and was jerking the brake lever back hard. The engine shot around the curve ahead of them only a few hundred feet away and coming fast. Before the motor car came to a stop Hannigan leaped off. He saw that his men never could lift the car from the rails in time to avoid its being hit. Grabbing his hat from his head he swung it violently in the air. The vertical plume issuing from the smoke stack of the engine dropped and became a voluminous cloud, the brakes screeched as steel gripped steel, and the big engine came to a halt within a few feet of Hannigan's men, who had succeeded in getting one end of the car off the rails and then jumped for their lives. It was a close call for them.

When they saw that the engine had stopped they quickly returned to their car and lifted it back upon the rails. There was barely enough room in the cut to set it off the track and have it in the clear. Running it back to the end of the cut they placed it on the set-off. When the engineer—Old Dave Thorndyke—saw that the men had their car safely out of his way he released his brakes and started the train. With slow but violent coughs it gathered way and started eastward. As the engine drew slowly past Hannigan Old Dave leaned out of the cab window, his hand on the throttle, and smilingly shook his head. It was a friendly admonition to be careful. Hannigan laughed—not because he felt that he had done something worth laughing about, but because he felt relieved over the outcome of the encounter. It was a nervous laugh. He had taken a chance—he and the men running the car—and had been lucky enough not to suffer serious consequences. For a few seconds he had thought that his car was doomed, then, due to the prompt action of the engineer, it had been saved from destruction. He was immensely relieved, but the reaction left him nervous. On the spot he resolved not to take any more chances while running his motor car.

The freight pulled slowly past and when the caboose came along the conductor was out on the rear platform.

"What'd he stop for?" he yelled to Hannigan.

"I stopped him," shouted back the foreman. "Had to or he'd have hit us."

The conductor nodded and stepping down on the caboose steps he "high-balled" the head end. The train disappeared down the track and the section men lifted their car back upon the track.

"Before we start," said Hannigan, "I want to tell all of you that we'll take no more chances running fast or going around curves without stopping and listening first. You all saw what happened just now. Nobody got hurt and the car is all right, but I want to tell you men that if any other engineer than Old Dave Thorndyke had been on that train that right now we'd have no car and possibly some of us would be ready for the hospital—or

the morgue. I want it understood by whoever runs this car—whether it's Hansen or anybody else—that it is not to be run over 15 miles an hour and that we'll stop and listen before starting around a curve. Doesn't make any difference whether we're in a hurry or not. We might better get home late than never. I was in as much of a hurry as any of you, I'll admit. But I've had my lesson and I'm not going to forget it right away, either. Just one thing saved us and that was Old Dave's carefulness. He's all right, Old Dave is. Right on the job all the time."

"I was pushing the car pretty fast," admitted Hansen. "We were a little late and I wanted to get home as soon as I could and I guess the rest of us did, too. But it don't pay to take a chance; there's too much risk."

Hansen's views were shared by the rest of the gang and no one said much. No one cared to repeat the experience. Cranking the car, they got on and were soon in Breckenridge. Placing the car in the car house they immediately disbanded for their homes, still nervous from their narrow escape.

* * * * * * *

After Old Dave pulled by Hannigan and his men he did not have to stop again until he reached Centralia, where he had a meet on Extra 5023 West. Dave had Engine 5130 and was pulling a drag of dead freight to Calera, where he had instructions to turn his engine, pick up anything there was at Calera for the west, return to Gridley and tie up. He expected to get back to Gridley, his terminal, some time in the morning. When he pulled into Centralia, Extra 5023 West was waiting for him, so he was not delayed there. Nos. 9 and 10, the night passenger trains, were on time, so Ellsworth, his conductor, told him. He had just time enough to make Montrose for them. Everything was promising for a good run.

Nearly everyone on the C. St. P. R. R. knew Old Dave. He was 54 years old and during his career had pulled trains over almost every division of the road. His hair was thick and perfectly white; his face bronzed through long years of exposure to the elements and his eyes were deep-set and kindly. Everyone liked Dave. To his fellow-employees he was always obliging and friendly—always ready to do any of them a good turn. He had held passenger runs at different times and had many friends among the traveling public. He was noted for being careful. Safety rules and bulletins which were issued from time to time never affected Old Dave, for he observed the instructions which they contained even before they were distributed among the employees. In all of his many years of railroading he had never had a serious accident. It was only natural that the officers of the road should have a high regard for him.

It was 11:17 p. m. by the time Dave had his train set out and the westbounds picked up at Calera. Ellsworth went after his running orders while Dave was taking coal and water and at 11:30 Extra 5130 West whistled off. In five hours, if he had good luck, Old Dave expected to be tied up at Gridley.

Once out of Calera yards he gradually opened the throttle wider and wider until the 5130 rolled along at the rate of 30 miles per hour. It was a fine spring night and the air was soft and balmy; the engine was steaming well and except that the headlight was focused entirely too high to see ahead well everything was as right as could be. Most of the telegraph offices were closed and the towns were dark, but the signals on the train-order boards and the lamps on the switch stands gleamed green reassuringly. Thirty car lengths behind him out of the void of darkness gleamed the "all right" of the rear brakeman's high-ball as the train passed each station.

Old Dave knew there was another extra ahead of him somewhere. He had seen it leave Calera shortly after his arrival. Extra 5522 West with a train of "shorts" was peddling loads and empties to the various stations along the line. It happened that they had a car of tile for Hatches Siding. They had set it out there and left nearly an hour before Extra 5130's headlight brightened the east with its high-angled beam.

What Dave did not know was that the car, due to a defective hand brake and the vibration of the train that had set it out, had moved slowly down the siding until it struck the frog and came to a standstill fouling the main line. The head brakeman on the 5522 had set the hand brake, so he thought. But the brake chain was so long that though he pulled the wheel tight the brake shoes did not grip the wheels. The engine had coupled on the train and rumbled out of town past the car. As it did so the car very slowly started towards the west end of the siding. The incline was not great and it gathered but little momentum on its short journey to the switch, so that when it struck the slight elevation of the lead it almost halted and the stiff spring in the frog furnished enough resistance to stop it entirely.

But Dave didn't know this. Neither he nor the crew ahead that set the car out had had any notice that the derail had been broken and removed by Hannigan a few hours before. Ahead of him he could see the dark end of a box car on the siding. That was nothing unusual. Some train had set it out since he passed there on his eastward trip. It never occurred to him that the car might be foul of the main line. Wasn't there a derail on the siding? How could it be foul of the main line, then? Impossible, of course. With the assurance that the track was clear Old Dave drove his engine with unslackened speed. When he was within a few rods of the car he noticed that the farther end of it seemed unusually close to the main line. It was close! It was over the frog! When he realized this Old Dave closed his throttle and jerked the air brake lever. Almost at the same instant the engine crashed into the car. There was a splintering sound as the steel boiler of the engine passed through the side of the car. Then it hit the right side of the cab, crushing it into a mass of twisted and splintered wreckage. The train came to a stop. Benton, the fireman, got up from the floor of the engine cab where the sudden application of the brakes had thrown him. "Dave! Where are you?" he called. No one answered. "Dave! Oh, Dave!" he shouted louder. But Old Dave did not answer. Groping his way to the tender he felt blindly for a lantern, as the lights were all gone. Striking a match he lighted it and by the aid of its dim light made his way to the wreckage that had been the cab. And there, under it, he found Old Dave. Stooping down he lifted him up. His body hung limp in Benton's arms; his white hair stained with blood. "Dave! Speak to me! Are you badly hurt?" he called, as he knelt beside the old engineer. He placed his hand over the old man's heart. It was still. Old Dave had made his last run.

* * * * * * *

Foreman Hannigan heard of the accident about an hour and a half later. In the early hours of morning just as the first faint flush of dawn appeared, his phone roused him from sleep. He took down the receiver.

"Hello!" he said drowsily.

"This you, Hannigan?" came the night operator's voice over the wire.

"Yes—this is Hannigan."

"They want you to get your men and hurry over to Hatches Siding to repair the track. Extra 5130 West side-swiped a car there. Old Dave Thorndyke was on the engine and was killed—crushed in his cab. Too bad—he was a mighty nice old man. I'm sorry he had to go."

"But—but the siding was clear of cars yesterday afternoon when I left there," said Hannigan, now wide-awake.

"Yes, this car had only been set out there just a short time before the 5130 came along," explained the operator.

"But how could—" then Hannigan remembered.

He dropped the receiver and sat down weakly in the nearest chair. "I—I forgot," he whispered. Hannigan understood it all now. It was all too clear to him. He had taken a chance running in and Old Dave's carefulness had saved him. The narrowness of his escape had caused him to forget to report that he had removed the derail from the siding. And now Old Dave was dead.

In the east the miracle of dawn crept into the spring sky with wondrous tints of lemon, orange and rose. At the top of a blossom-laden apple tree near the house a robin burst into song. But Hannigan neither heard nor saw these things. His horizon was dark and gray and his heart filled with sorrow and regret.

The Selection of the Yard Foreman

By W. F. Rench

IN A RECENT personal mention item it was recorded that the officer referred to had been promoted from section foreman to extra gang foreman, then to foreman of a terminal and then to roadmaster. This suggests a point that is often overlooked, viz., that the yard foreman should be of a rank but little below that of supervisor. Frequently the converse of this proposition appears to be assumed as true. It is a fact that more than one yard is under the charge of a foreman who has failed to make good on the main line. The thought seems to be that as no considerable speed is used through the yard, an indifferent or even an inattentive foreman may suffice to maintain passable conditions. When the amount of trackage, the number of switches and the extent and variety of side duties are considered, it is not to be wondered at that yard movements are interrupted by accidents occurring upon inadequate tracks.

A yard comprising 50 or more miles of track and as many as 200 switches will require several subsidiary units for efficient maintenance. The supervision of the work of these gangs, the judicious supply and distribution of materials, provision for the use of tracks, the prompt handling of emergency repairs, all require a yard foreman with a large degree of intelligence as well as ample initiative and a certain amount of aggressiveness. It is especially necessary that the foreman shall be able to diagnose the causes of accidents, not only in order to render a correct report, but in the case of a track defect to determine what correction to apply. Too often the yard trainmen are of the easy-going type, and are content to make no report of such occurrences when the damage has been slight. Thus the cause may remain to produce another and perhaps worse accident. It should be a matter of conscience with the foreman to probe the matter fearlessly and, if due to a track condition, to apply the remedy without delay.

Although the yard may have trackwalkers of ample reliability who will always be vigilant to detect defects, the efficient track foreman will supplement their inspection with his own. He will do this not merely by casual observation, but with frequent use of the track gage and the level board. He will not rely upon his memory for a register of conditions found, but will keep a careful diary of his examinations. Defects that cannot be corrected immediately will be followed up until ultimately remedied.

The successful yard foreman will maintain friendly relations with the yardmen, so that proper facilities for conducting the repairs may be furnished ungrudgingly. It is not at all necessary that he shall be recognized as a good fellow, who always has an hour at his disposal for gossip and small talk. He can be cordial without being familiar, open and frank without sacrificing his authority, and can obtain by request what he might demand if compelled to do so. He will be accurate in the information conveyed to the yard operatives so that reliance may be placed upon his statements of the use of tracks required. He will faithfully fulfill the obligations assumed, knowing that annoyance and delay may result from his failure. He will require his various sub-forces to respond immediately for emergency work and render their best efforts while the emergency lasts.

One of the principal shortcomings of many yard forces is the tendency to leave unfinished repairs that are undertaken. A track is partly raised, tie renewals are commenced, the replacement of rail is begun, and if the yard force is called away temporarily, the repairs are overlooked. As a rule, it is not the general condition of ties in a track that causes accident, but in an isolated spot which could just as well have been attended to when renewals in the particular track were last being made. This point is of especial importance in those yards that are worked to full capacity. The attentive yard foreman will follow up such matters consistently, and require the completion of all repairs that are undertaken.

A prime requirement of a successful foreman in any situation is that he shall be able to obtain and retain an adequate supply of good labor. With the many opportunities for overtime occurring in all yards, this should not be difficult to attain. The treatment accorded his men, the housing facilities provided and, above all, the equal and just advantages shared among them in the allotment of special and overtime jobs, should solve the problem effectively. Since yards are usually close to the larger settlements, the labor supply only needs to be sought out and drawn upon judiciously.

It is not so necessary that the yard foreman shall be versed in the niceties of switch construction as that he shall be able to do the little things required to keep a switch in working order, or to restore one quickly after being damaged. Since a great many switches of obsolete design remain in yard use, he will need to contrive ways of adapting present materials to the repair of the older types. To avoid all chance of delay in making emergency repairs, the live foreman will see to it that a sufficient stock of repair parts is kept on hand, and in places where they can be obtained readily. An important item in the yard foreman's duties is to recognize the moment when switches and frogs have attained the limit of safe wear. It is poor economy to renew such members before this state has been reached. He will have no arbitrary standard to guide him, and his judgment alone will be the determining element. His alert inspections will similarly be the means of detecting improper line through the switch leads, or imperfect surface back of the connections, both of which defects are fruitful sources of accident.

The yard foreman will often be called upon to cooperate in transportation matters. In picking up a spilled load or transferring freight there is frequent opportunity

for the exercise of inventive faculty. A hopper of coal is dropped into the track and must be gathered up and reloaded upon the same car, which is generally a gondola. A flat car can be obtained easily, and pushed along by the men as the coal is loaded. If placed against the gondola much labor is lost in several times rehandling the material; if placed alongside it, the coal is reloaded with a single handling. A load of grain is to be gathered up or transferred; the utility of canvas bags is too well known to require any comment. When the material is heavy beyond the ability of one gang, a second or third will be added. If the transfer cannot safely be made by any force of men, the careful foreman will not hesitate to demand a crane or a wrecking derrick. Accidents have happened to men through a foreman unwisely undertaking a transfer that required the use of a machine.

The safety of men working in yards is even more a charge upon the foreman and his assistants than is the case on the main line. This is especially so in classification yards, where the need can best be met by the use of a track for the period of repair and the closing of the track to the movement of cars. Even then diligent watching is required that the men do not obstruct adjoining tracks, or move too close to these tracks while cars are being run in upon them. The same warning is not given in yard operation as on the main line, and movements are constantly being made in alternate directions. The safe progress of the pony car or the hand truck about the yard will also be a matter of concern to the attentive foreman. If he is duly considerate his use of the hand truck will be limited to such work as requires it. The pony truck which does not need the use of a track will be employed in its stead whenever possible. By giving attention to this feature he will conserve the good will of the yardmasters, since the use of a track always entails some interference and more or less bother in the midst of other exacting duties.

The economical use of materials devolves in a special degree upon the yard foreman. The supervisors have a serious problem to maintain their main tracks fit for service and are only able to give their yards routine supervision. The foreman must therefore be depended upon to keep up his stock of repair material and use it judiciously. In this regard a few suggestions may be timely. Tie plates are necessary on the sharp curves of turnouts, are desirable on other curves, but are seldom justifiable on the tangents in yards. The tie rod is a most useful contrivance for maintaining gage on curves, especially in switch leads, but an excessive number in such places, or their use at all on tangents, is an extravagance which should be avoided. Five tie rods is the most that need ever be used in any turnout. In applying the tie rods there is great chance that the gage will be dangerously narrowed, unless the track gage is set near the point where the rod is being placed. Rail anti-creepers may be applied in too great numbers, or at places where their full value will not be realized. The efficient yard foreman will carefully check up the use of materials by his various forces, and insist upon due economy.

It is a poor investment to have a foreman in charge of a yard who will not give proper care to the matter of its policing. A recent order of the Railroad Administration emphasizes the importance of keeping loose materials picked up that are a source of danger to brakemen alighting from cars and to car inspectors traveling along the cars intent upon their inspections. If the materials cannot immediately be taken out of the yard they can at least be placed for the moment upon the ends of the ties where persons will not be likely to stumble over them. The foreman will also note any derangement of the inclined covers placed over the vents containing pipes used for charging the air or for watering stock. He will at once make temporary repairs, and promptly report the matter for further attention.

In view of the increased requirements of his service it would seem that the divisions well may establish a large enough wage to make the job attractive to the right man. Since his detailed direction of either the regular or emergency repairs is not the thing most required, but rather his general supervision of the yard repairs as a whole, he should, as an abstract proposition, have an established monthly salary and be relieved of overtime work to as great an extent as practicable. He would thus be better able to meet the routine requirements of the position, have a higher standing among the men he has to work alongside of, and be better satisfied with his job. It is quite certain that many foremen, not only in yard work, but in section work as well, are restive over the restraints imposed upon their individual action by present maintenance practice.

The eight-hour day was universally acceptable and few foremen desired overtime work. Indeed, many of them regret the present return to the ten-hour day, even though it carries increased compensation. There is one reward, not commonly assured but which is in force on some roads, that would furnish a positive incentive to men promoted to yard foreman to develop capacity for even greater responsibility. It is the definite knowledge of being held eligible to the position of roadmaster or supervisor. Several concrete instances where foremen of a terminal have been promoted and made good as supervisors, confirms the correctness of this practice.

TRACINGS NEED NOT BE FILED

THE SO-CALLED Map Order of the Interstate Commerce Commission under which all the railroads were required to furnish tracings or lithographic reproductions of tracings of maps and profiles has been modified so that the railroads will only be required to furnish blueprints or white line reproductions, the tracings to be kept on file by the railroads themselves. The original order, which was dated January 12, 1914, and modified and supplemented by Valuation Orders Numbers 5 and 6, under date of November 21, 1914, has now been further modified by Valuation Order Number 23, the text of which is as follows:

"It is further ordered, that carriers are relieved from the requirements to file tracings, or lithographic reproductions of tracings, of maps and profiles with the commission at Washington, D. C. Carriers are required to preserve the original tracings of maps and profiles, prepared in the form and manner prescribed by the Map Order, so called, in a safe receptacle, subject to the inspection of the commission.

"The original tracings shall not be in any way changed, added to, or substracted from, for the purpose of showing changes in the property. Subsequent changes shall be indicated by an independent map or profile, and a memorandum shall appear upon the original tracing stating that changes have been made and referring to the map or profile tracing upon which they are shown.

"Each carrier shall file with the commission, not later than one year from its date of valuation, a certificate showing what maps and profiles have been prepared, and that the same are in accordance with the order of the commission, and shall at the end of each subsequent year make a similar certificate until all the tracings required as of the date of valuation have been fully completed in accordance with said map order.

"Carriers shall furnish the commission with blue print or white print copies of original tracings showing subsequent changes whenever so required."

Overhead Conductors Made the Work Difficult

RENEWING DOUBLE-SLIP CROSSINGS AS A UNIT

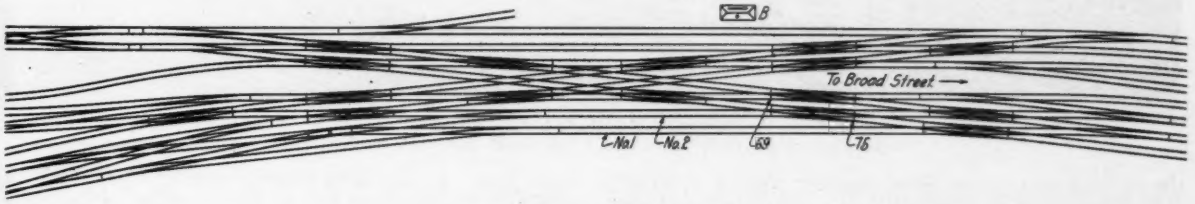
Under the Handicap of An Extremely Heavy Traffic, the Use of Derricks Results in Saving of Time and Labor

BY THE USE of derricks in the renewal of the No. 10 double-slip crossings on the elevated railroad at B Tower in Philadelphia, Pa., the maintenance of way department of the Pennsylvania Railroad established a new precedent in the method of handling work of this character in congested districts. It gained three weeks' time on the approaching winter, doubled the output of work per man per hour and reduced by 50 per cent the number of days required for doing the work. Aside from the important savings effected, the work is interesting because of the conditions under which it was carried on.

B Tower is located in one of the most congested districts on the Pennsylvania system, being at the throat through which all traffic to and from Broad street station passes. There are six tracks at this point, slip crossings in which permit trains to be criss-crossed and headed south to Washington, west to Pittsburgh or east to New York. In 24 hours 1,350 trains of all classes pass the tower. The territory concerned is included within the electric zone and the overhead catenary system presented further obstacles to the use of derricks.

The work to be done consisted of the replacing of six, No. 10 P. S., 100-lb. double-slip crossings with 130-lb. material. Not including end frogs, each slip has a weight of 36,000 lb., while the switch ties, taken together, weigh 20,000 lb., giving a total weight of 56,000 lb. for an assembled switch.

The force employed on the work included 12 men from the signal department, 6 men from the electric traction department and 58 men from the track department and the renewal of two double-slip crossings was fixed as a day's work. The new slips were built up in an open flat within 25 ft. of the point of application. All rails, switches, etc., were spiked to the timber, and signal and electric bond wires were applied, as were the interlocking appliances, all being built for service as soon as the coupling and lining could be completed.



The Layout at Tower B

Traffic conditions made it necessary to make the actual installations on Sundays and the first two switches, No. 69 and No. 75 in track 2, were installed on October 26. At 7:30 a. m. on that day the department was given the use of the tracks necessary in the removal of the old switches. These were torn out piece by piece, the timber, rail, etc., removed and the sub-grade leveled off for the new switches. Two steam derricks were then run into position, one on No. 3 track and the other on track No. 4. The first operation was to pick up the slip to go in the east end of No. 69 switch. Within 25 min. this new switch was in position ready to be coupled up at each end. The derricks were then moved west, picking up No. 75 switch, moving it 75 ft. to place. They were then moved off the elevated line and the overhead wires, which it had been necessary to cut to permit the derricks to function, were restored to service. As soon as the switches were placed the track and signalmen began the work of

coupling up and the tracks were turned into service at 2:29 p. m. or in one minute less than seven hours after the beginning of operations.

In the past these switches have been renewed piecemeal; that is to say, the various parts were placed in track one by one, a method which implied setting up the switches beforehand, at some convenient point alongside the track in order to make certain that the various parts were all on hand, that they would fit and were arranged in sequence and order so that the parts would be readily available when the time came to place the material in track. Working in this manner only one switch could be renewed in a working day and as traffic conditions made it imperative that the renewals be attempted on Sundays only, six weeks would be required to complete the job. Furthermore, this method did not permit the various parts to be fitted together well or accurately and the preliminary assembly of material consumed valuable time.

The utilization of the derricks to place the assembled switches made it possible to apply the time formerly consumed in the preliminary fitting by the old method to the permanent construction of the switch. In addition to this important saving of labor the pre-assembly of material in its final form made it possible and with the same force, to install two slips in the same or less time than would be required to install one by the old method. When it is considered that the traffic conditions are such that on Sundays only can the actual work of installation be carried on, an actual saving of three weeks' time resulted from the new method employed.

In planning to carry out the work with derricks it was appreciated that the necessity of cutting the catenary system over a certain district would result in three tracks being out of service for a part of the time consumed in completing the work, and this was the principal reason advanced against the plan. As a matter of record two tracks were out of service for the duration of the work and the third track for about one hour and a half. The success attained in the first day's work with derricks was such that the remaining four crossings were renewed in the same manner.

This work was carried on under the direct supervision of W. F. Miller, supervisor at West Philadelphia, Pa., to whom the *Railway Maintenance Engineer* is indebted for the preceding information.

Swinging the Switch into Place

SODIUM FLUORIDE AS A PRESERVATIVE

IN 1914 a number of sap-pine ties treated with sodium fluoride together with like ties treated with zinc chloride and creosote were placed by the Forest Products Laboratory, Madison, Wis., in one of the mines of the Tennessee Coal, Iron & Railway Company at Birmingham, Ala. At the same time a number of red oak ties similarly treated were placed in the tracks of the Baltimore & Ohio. This attempt to secure some service records of ties so treated was the result of some laboratory tests made years ago, which indicated that sodium fluoride, because of its high toxicity, its non-injuriousness to metals and its convenience of handling might prove to be a successful wood preservative.

After five years of service, the ties in the mine at Birmingham were examined and it was found that the ties treated with sodium fluoride were in as good a condition as those treated with zinc chloride. The creosoted ties were apparently in a still better condition, while the untreated ties were in various stages of advanced decay. An examination of the red oak ties placed on the Baltimore & Ohio showed that the ties treated by sodium fluoride and by zinc chloride were all sound with little or no difference between them, while a large percentage of the untreated oak ties had been already removed. These two tests as well as others started after them will necessarily have to continue for a number of years before anything definite can be determined.

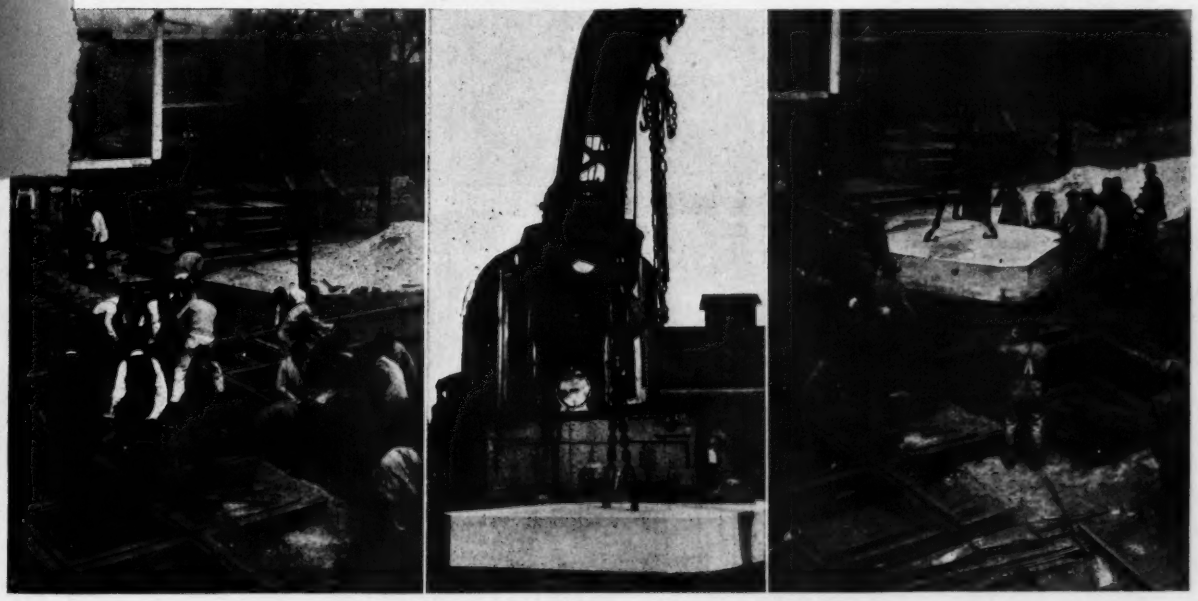
CONCRETE SLABS UNDER RAILWAY CROSSINGS

Chicago, Burlington & Quincy Installs Two Types of Concrete Crossing Frog Foundations

HE INSTALLATION of two types of concrete crossing foundations by the Chicago, Burlington & Quincy at Hastings, Neb., and at Omaha, Neb., is much of interest to the engineer or maintenance man who is confronted with the problem of re- the maintenance and replacement of crossing These installations, which were brought about by ed of a firmer base to support the heavy traffic, are the crossing of the two main line tracks of the Bur- with those of the Union Pacific and the St. Joseph nd Island at Hastings, and again under a three- skew crossing of the Union Pacific in the lower yard at the foot of Howard street in Omaha.

type of foundation which was used at Hastings is approximately square, with outside dimensions of 10 ft. by 10 ft. and a depth of 1 ft. 8 in., the corners being beveled or chamfered so as to form a 45-deg. angle with the sides. The reinforcing of the blocks was accomplished by the use of ¾-in. square corrugated iron bars, which were laid six inches apart in sets of three and at two levels, the upper layer being three inches from the top and the lower the same distance from the bottom. Proper handling was assured by the use of two standard bridge slab stirrups made of ¾-in. stock and set on a 60-deg. angle with the horizontal at opposite corners. The lower end or spread part of the stirrup came below the bottom row of reinforcing bars at their intersection, while the loop of the stirrup was not allowed to come above the surface, depressions being formed in the concrete at the loop to allow for the hooking or fastening of the lifting chains used in their handling.

The second type used differs greatly in design from the first, following in some respects the outline of a parallelogram. It is also made in two sections per crossing or a total of six for the Omaha installation. The individual sections were exact duplicates, being poured in a two-compartment form which thus insured an identical content in each of the two parts and a continuous surface under each crossing. The total over-all length of the slab is 19 ft. 2¼ in., and the width 5 ft. 6 in., with a depth of 1 ft. 8 in. Corrugated reinforcing bars of ¾-in. stock varying in length from 3 ft. 6 in. to 15 ft. 3 in. were used, and laid, as in the preceding case, in two layers at a distance of 3 in. from the top and bottom of the slab. The spacing of the bars, however, did not conform to the line of the rail, but was made in rectangular form, the bars being two feet apart longitudinally and one foot crosswise. Two stirrups of the same specifications were installed at opposite ends of each slab, the spread part coming below the lower layer of reinforcing bars and the loop flush with the surface.



Three Views Showing How the Foundation Slabs Were Installed

In each of the sections, two upper layer bars and two lower layer bars were allowed to extend out about 1 ft. 2 in. near one of the shoulders of this irregularly shaped slab. By referring to the plan it will be noted that each crossing foundation is composed of two sections, one of which is reversed, their union leaving an irregular opening to be filled with concrete, thus forming a bond to unite the entire installation. It was for this purpose that the bars were allowed to extend from the sections and through their use and the addition of four ½-in. square corrugated iron bars laid in two layers, a satisfactory bond was formed between the two sections of the foundation. The two end sections were handled in a similar manner, being securely held by L-shaped concrete blocks reinforced by four additional ½-in. bars, the bonding being accomplished by the use of extension bars on the lower sections and through the use of an extension or lip on one corner of the upper, which gave it the necessary grip to hold it firmly in position.

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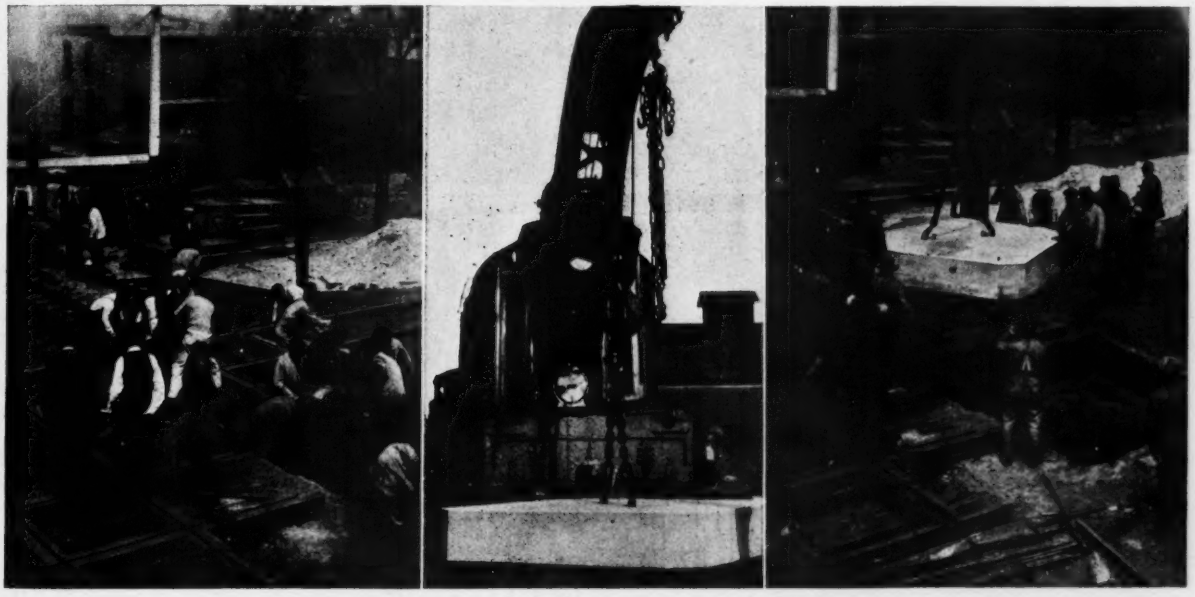
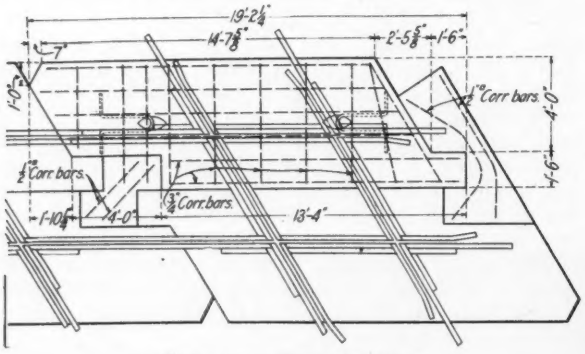


Three Views Showing How the Foundation Slabs Were Installed

In each of the sections, two upper layer bars and two lower layer bars were allowed to extend out about 1 ft. 2 in. near one of the shoulders of this irregularly shaped slab. By referring to the plan it will be noted that each crossing foundation is composed of two sections, one of which is reversed, their union leaving an irregular opening to be filled with concrete, thus forming a bond to unite the entire installation. It was for this purpose that the bars were allowed to extend from the sections and through their use and the addition of four ½-in. square corrugated iron bars laid in two layers, a satisfactory bond was formed between the two sections of the foundation. The two end sections were handled in a similar manner, being securely held by L-shaped concrete blocks reinforced by four additional ½-in. bars, the bonding being accomplished by the use of extension bars on the lower sections and through the use of an extension or lip on one corner of the upper, which gave it the necessary grip to hold it firmly in position.

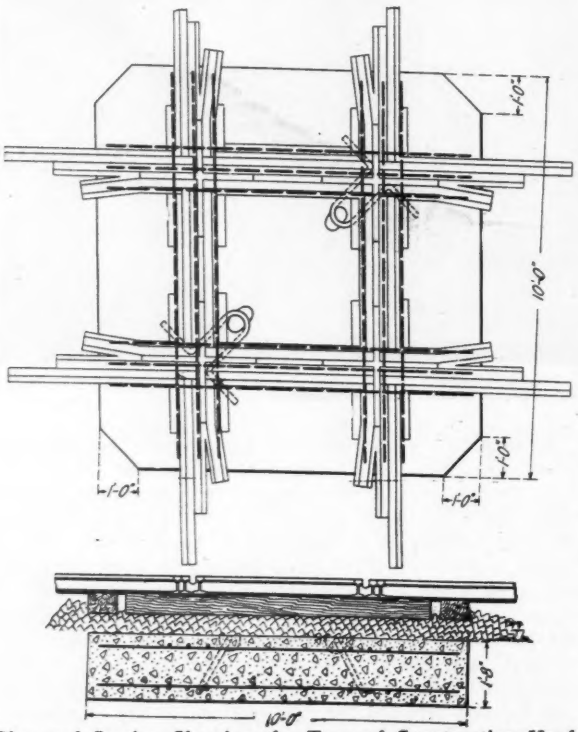
In preparing the track for the installation of these crossing foundations, and especially in the first case, it

was necessary to work to a prearranged schedule in order that traffic would be delayed as little as possible. The concrete slabs which had been cast at the concrete products plant of the Burlington at Havelock, Neb., and shipped on flat cars to the desired location, were brought to the crossing site in readiness for their quick handling as soon as all preparatory work had been done. All other



Slabs for a Skew Crossing

new equipment which was to be used in necessary replacements was also brought up and kept near at hand. The actual work commenced with the digging of two pits for the slabs and the cribbing up of the tracks over the holes by means of timbers, other necessary work such as rail cutting, etc., being done before removing the old crossing and placing the new. As soon as the holes were excavated to a depth of about 2 ft. 2 in. below the base of



Plan and Section Showing the Type of Construction Used at a Square Crossing

the tie, the first crossing was removed and the concrete slab brought forward by means of a derrick car and lowered into place. The slab was then given a top dressing of about 4 to 6 in. of cinders, the new crossing was lowered into place and the work of connecting it up and raising it to grade immediately started. During the period of placing the first slab, similar work was being done at the other three crossings, a close check being kept to insure that not more than two were completely out of service at any one time. As a result there was a minimum delay of traffic at this point and the work proceeded rapidly, the total delay caused by trains being slightly less than an hour and that to all trains slightly less than 10 hr.

The installation of the foundation for the skew crossing at Omaha was handled in a similar manner, and in common with the crossings at Hastings, has proved to be a satisfactory solution of the requirements for larger bearing surface areas under railway crossings. The cost of this work naturally varies with the conditions encountered and the amount of new material needed. In the Hastings installation the slabs averaged about $35.72 apiece and the labor, which included all work incident to

Another View of an Installation

changing and renewing the crossing frogs, rails, ties, etc., amounted to $212. The first cost of the concrete slab was approximately five per cent of the cost of the crossing, and although the labor necessary to install this type of foundation was somewhat higher than would normally be the case, the economies resulting from its use, such as decreased maintenance expenditures, and an increased length of life for the crossings more than offset this difference.

We are indebted for the above information to F. T. Darrow, assistant chief engineer, Chicago, Burlington & Quincy, Lines West of the Missouri River, Lincoln, Neb.

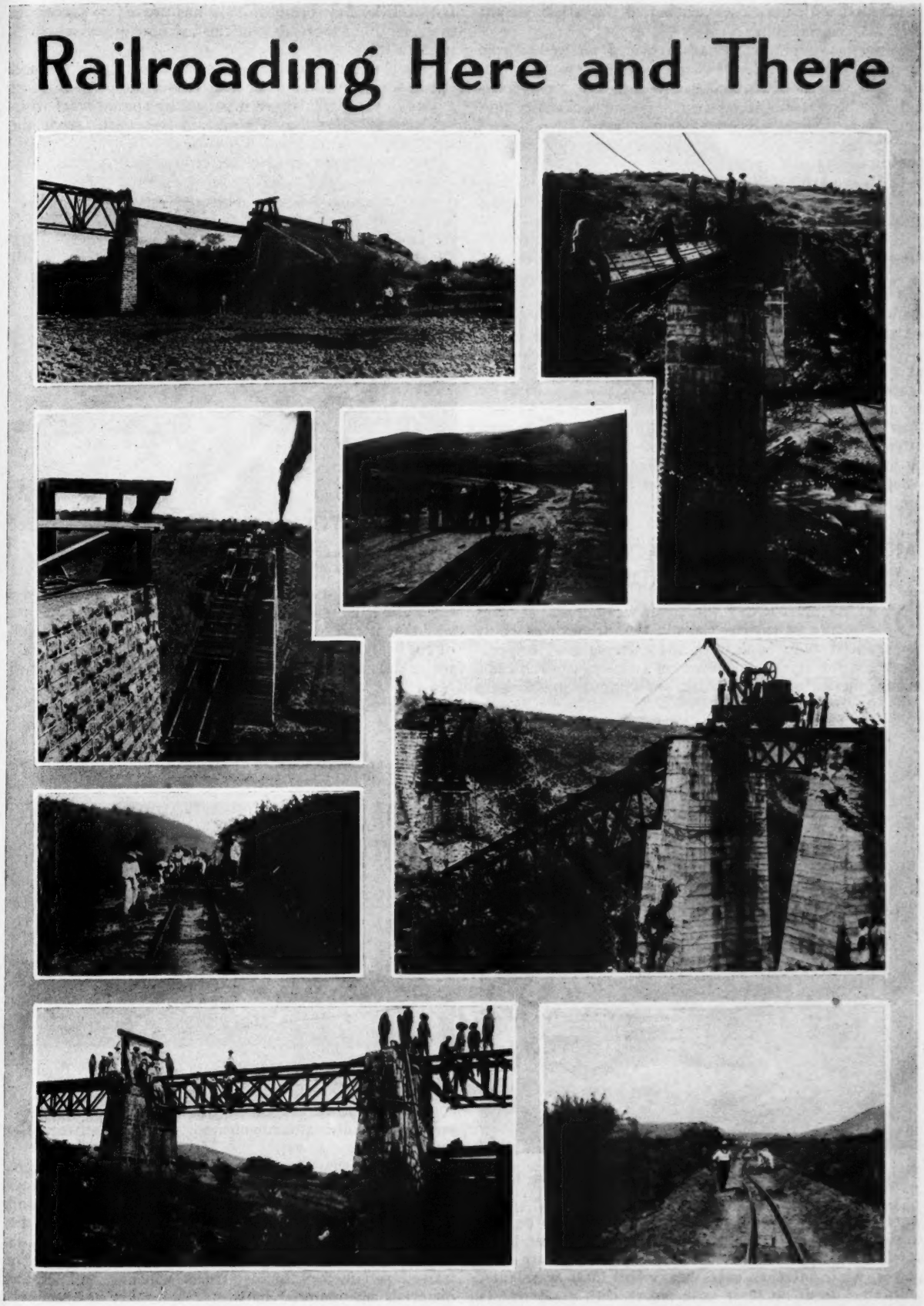
RELATION BETWEEN WEIGHT OF RAIL AND AXLE LOADS IN INDIA

THE QUESTION OF the relation between the weight of rail and the allowable axle load has been a live one in India for a number of years and was the subject of an article prepared by G. Richards, chief engineer with the Railroad Board of India, published in a current issue of the Railway Gazette (London). The scale of maximum axle loads established by the Railway Board in 1913 is as follows for track of 5-ft. 6-in. gage:

Axle-load, i. e., weight on a pair of wheels including weight of wheels and axles.	Minimum weight of rail per yard in lb.
26,880 lb.	60
30,240 lb.	65
33,824 lb.	70
30,080 lb.	75
41,664 lb.	80
45,696 lb.	85
50,624 lb.	90
55,328 lb.	95
60,256 lb.	100

For track of meter and 3-ft. 6-in. gage, the minimum weight of rail per yard for each long ton of weight is fixed at 5 lb. These schedules are modified by the pro-

Railroading Here and There



MEXICO IS RESTORING RAILROADS DESTROYED BY BANDITS

The resumption of railway operation on a large part of the Mexican railroads has entailed heavy repair work, including the renewal of burned ties, the relaying of rail and the replacement of bridge substructures and superstructures. Considerable ingenuity has been displayed in carrying on the work with meager equipment.

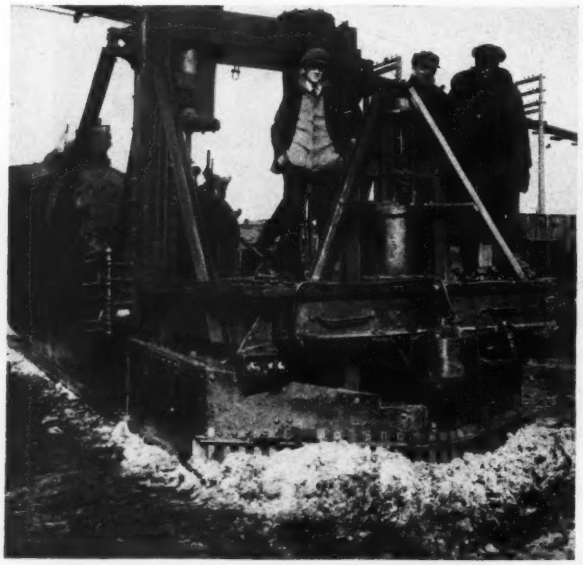
vision that with the closer spacing of ties a less weight of rail is permissible.

These maximum axle loads replaced an earlier rule limiting loads on tracks of all gages to one ton of weight for each 5 lb. of rail, which had been found to give loadings too heavy for the light rails, but unnecessarily limiting them for rails over 60 lb. per yard. No figures were given to show how heavy an axle load a rail may be permitted to carry by reducing the spacing between ties, but it is doubtful if a spacing of less than 30 in. justifies any excess over the axle loads prescribed in the schedule given.

The type of joint generally used is a suspended joint with the supporting ties as close as the contour of the joint will permit; it is believed that this joint is weaker than the rest of the rail and so long as this condition exists, it is evident that the joint would not be strengthened by inserting additional ties. In the case of a road using joints stronger than the rest of the rail it is safe to increase the axle load and permit it to vary inversely with the tie spacing up to a certain limit, although it will probably be found uneconomical to lay a track with ties spaced closer than 30 in. apart. It was suggested that it will, however, often be economical to strengthen existing light track by inserting additional ties instead of renewing the rails where the rail joint is already as strong as the rail with the shorter tie spacing.

AN ICE CUTTING ATTACHMENT FOR HEAVY SPREADERS

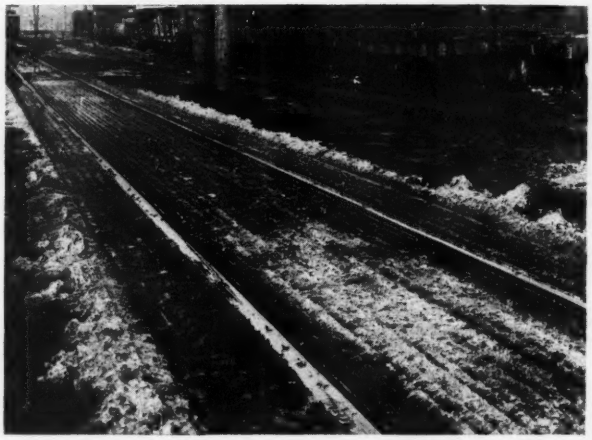
DURING THE PAST winter the weather was at times so severe in eastern Canada that traffic was badly demoralized, both because of the extreme low temperatures and the formation of ice on and between the rails. Where the ice was at all thick, snow plows and flangers



Jordan Spreader and Attachment Breaking Out Ice

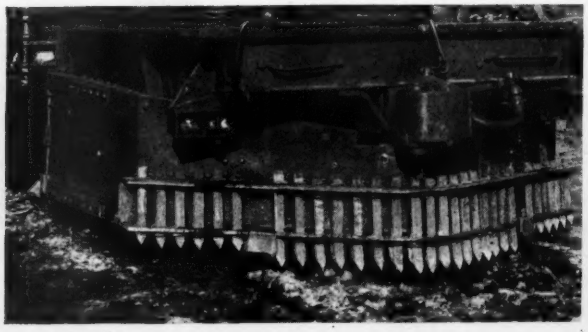
were practically useless and other means had to be used to clear the tracks. Hand picks and pneumatic tie tampers fitted with picks were used in large numbers in some places, while in other cases heavy spreaders were fitted with steel teeth on their nose pieces with good results. For use under the latter conditions, a special arrangement devised by the Canadian Pacific and tried out during the fall of 1918 and spring of 1919 has proved so successful that over 20 of these attachments are now in service on its Eastern lines.

This ice cutting attachment consists of a steel channel frame so designed as to fit snugly over the plow front of a Jordan spreader, where it is held by special bolts without necessitating the removal of any parts from the spreader. The channel contains a series of 29 interchangeable chisels or steel teeth, arranged so that there



The Appearance of the Track After One Trip

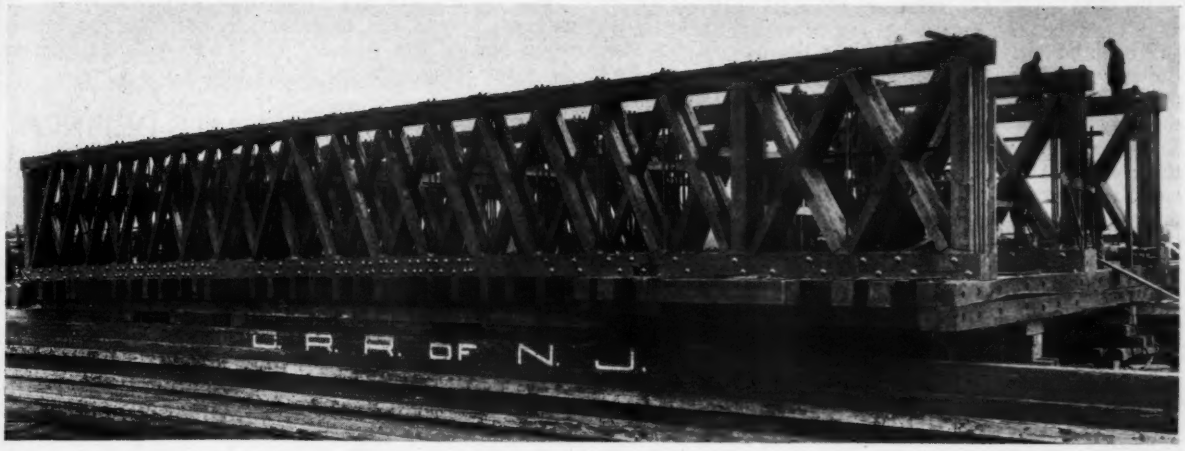
are six on the outside of each rail and 17 between the two. Each chisel is held independently in the frame in such a way that it can be adjusted quickly to regulate the depth of cut below the top of rail, or it can be removed entirely for re-dressing. In this way the chisel teeth can be used for a long time, their term of life being limited only by their over-all length and the amount of metal removed on regrinding. Flanged shoes are fastened under the frame and the spreader plow front, which ride the rails in a manner similar to that of a snowplow and, besides doing



Method of Mounting Chisel Teeth in the Channel Frame

considerable work in clearing the rail, act as a lining device to keep the attachment well centered between the rails.

The entire construction of the ice-cutting attachment is not only simple but durable and inexpensive. In actual operation one man controls the spreader, raising and lowering the attachment by means of the air lift on the front plow in order to clear obstructions or to work in and around switches, etc. The results obtained have proved satisfactory in ice, frozen cinders, and similar materials encountered in winter operation at terminals and freight yards, which materials were easily broken out, leaving the rails clean and with a good flange.



Putting on the Final Touches

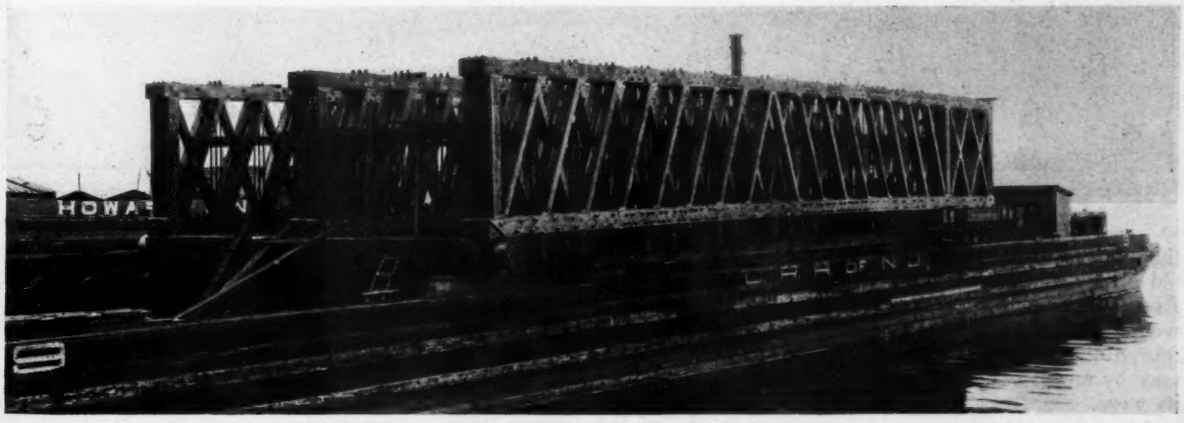
FRAMING HOWE TRUSSES BEFORE TREATMENT

Central Railroad of New Jersey Insures Thorough Protection by Assembling Bridge at Plant

THE CENTRAL Railroad of New Jersey has recently completed the installation of a transfer bridge of the Howe Truss type, which was framed in its entirety, then dismantled, creosoted and reassembled, before moving to its final location. The new structure replaced an old one which had been in continuous service for 13 years at the Central Railroad's Bronx terminal in New York City.

The erection of the bridge differed from the customary methods employed in that all the material entering into its construction was shipped direct to the creosoting plant at Port Reading, N. J., where it was assembled into the span. The members composing the bridge were run through the mill at the plant, where, in the majority of instances, they were sized by machinery, and where "gaining" was found necessary, the work was done on a tie-gaining machine. This practically eliminated hand labor and produced a uniform quality of work with a minimum possibility of error. As soon as this work was finished the different members were taken to an open area in the rear of the mill upon which a runway had been constructed previously to facilitate the erection. In assembling the bridge the heavier members were handled by locomotive cranes operating on tracks laid on each side of the runway.

After the entire structure had been completely assembled and all connections made, the operation was reversed and the span was dismantled piece by piece. Each member was marked carefully for identification and then loaded on tram cars for conveying to the creosoting cylinders, where it received the full cell treatment, having been thoroughly air-seasoned for one year previous to framing. About 8.5 lb. of creosote oil was absorbed per cu. ft. of timber.



The Complete Span, Shore End on the Left

The work of reassembling was carried on without any serious difficulties. The bridge itself was erected on an old car float about 235 ft. long and 36 ft. wide, drawing about 4 ft. 6 in. of water when light, the float having been moored in a slip between two piers upon which the tram cars carrying the creosoted timbers were run. The actual work of reassembling was similar to that in the original construction, the main difference being that the entire structure was supported, in this case, on six car trucks of 50 tons capacity, each free to run on rails laid

on the deck of the car float. These are clearly shown in the photograph below.

When the work of reassembling the new bridge was entirely completed the float was towed to the location of the old structure at the Bronx terminal and the interchanging of the two was begun. The old bridge was first blocked up off its pontoon onto piling at its outer or offshore and during high tide and, after the tide had gone out, the pontoon was removed. Immediately after this, the car float carrying the new bridge was towed under the raised portion of the old bridge and made fast. Several car trucks were then run forward and arranged, by the addition of heavy timber blocking, to receive the end blocked up. As soon as the incoming tide had raised the car float sufficiently to support the outer end of the old bridge, the blocking was removed from the piles, leaving the bridge supported by the 50-ton car trucks on the float and by the bridge seat on the shore end.

A derrick with a 50-ft. boom and capable of lifting a maximum load of 300 tons was then brought alongside the off-shore side of the rack and, through its use, the old bridge was gradually worked out onto the car float. As it was brought aboard the float, additional car trucks were placed under it, the new structure being gradually moved outward in order to keep the float in proper balance by means of power from a pile driver anchored off its stern.

After the old structure had been brought aboard the float it was towed out in the stream, turned end for end and once more brought into place. The shore end of the new span was then picked up by the derrick and carried to the bridge seat in a manner similar to that used in removing the old, the old bridge being moved out by the pile driver as the new bridge left the float, keeping the float properly balanced at every stage of the work. When the shore end of the new span was in position on the bridge seat the outer end was lifted by the derrick and the car float removed. The pontoon was then placed in position and the new bridge lowered onto it. By lifting the outer end of the new span with the derrick, instead of waiting for the tide to change, a saving of about 12 hr. was made.

By framing the timber previous to treatment in this manner, it was not necessary to cut into the treated wood, less oil was required and it also cost less to erect, the plant being adjacent to the mill.

SUBORDINATE OFFICIALS DEFINED

A HEARING was held before Commissioners Clark, Daniels and McChord of the Interstate Commerce Commission on March 15 and 16 to consider the question of what grades of railway employees or officers come under the classification of "subordinate officials" as provided in the portion of the new Transportation act relating to the settlement of labor controversies. A number of organizations of railway employees holding various degrees of responsibility were represented and contended that they should be classified as subordinate officials, while the representatives of the railroads desired to confine the classification of subordinate officials to those having very limited responsibility. On the other hand, the officers of the large brotherhoods insisted on their right to represent these smaller groups in wage controversies.

End View Showing Double Track and Car Trucks

As a consequence of this meeting the Interstate Commerce Commission issued definite rulings on the classification of various grades of positions above those of laborer and mechanic, covering the positions of claim agent, engineer, foreman, supervisor of signals, yardmaster, train dispatcher and storekeeper. The ruling for engineers, or what are termed "engineers of mechanics," and foremen are given below:

"Engineers of mechanics. This class shall include civil engineers inferior in rank to engineers of maintenance of way, chief engineers and division engineers—draftsmen, engineers of maintenance of way, and other engineers of mechanics, who are not vested with authority to employ, discipline or dismiss subordinates.

"Foremen. This class shall include foremen of mechanics, shops, tracks, bridges, etc., who are not vested with authority to employ, discipline or dismiss subordinates."

The commission also decided to modify its earlier order providing for three labor groups to nominate representatives by adding a fourth group consisting of the smaller organizations of employees. The group thus named in-

cludes 17 different organizations, of which the following concern employees of the engineering and maintenance of way department, namely, the Roadmasters' and Supervisors' Association of America, the International Association of Railroad Supervisors of Mechanics, and the American Association of Engineers.

A GENERAL UTILITY SHOVEL

THE BUCYRUS COMPANY, South Milwaukee, Wis., is introducing a new revolving shovel, known as the 30-B, which supersedes the 18-B, ⅞ cu. yd. revolving shovel, manufactured by that concern. The new shovel is intended to serve as a universal machine, inasmuch as it may be used as a revolving shovel, or with the addition of a few extra parts, as a dragline excavator, a clam-shell excavator, a locomotive crane, a sewer shovel, or—with a long boom and dipper sticks—for work requiring unusually high lifts.

In designing a steam shovel to combine so many features, there has always been the danger of attaining this universal scope of usefulness with some sacrificing of the power, speed or other necessary functions, which are essential for a machine built solely for any one of the above mentioned purposes. For instance, it has always been difficult to combine a revolving shovel into a dragline excavator without attaining this feature at the expense of the digging power of the machine when employed as a dragline excavator. After a thorough study and many tests, this problem is believed to have been successfully solved by the Bucyrus Company in the 30-B machine.

As a revolving shovel the machine carries a 1-cu. yd. dipper (struck measure). When heaped up, this capacity is about 1¼ cu. yd. Its truck frame is so designed that it will accommodate caterpillar traction, traction wheels or railroad trucks of any gage from 3 ft. 3 in. to 5 ft., these three mountings being interchangeable. Such a change can be made in the field at small expense. The working weight of the 30-B shovel on caterpillars is about 34 tons; on traction wheels, 31 tons, and on railroad trucks, 29½ tons.

The 30-B will carry a 1-cu. yd. clam-shell bucket with a 35-ft. boom or a ¾-cu. yd. clam shell bucket with a 40-ft. boom. The changes required in this installation include an additional drum on the main hoist shaft with the necessary brake, clutch, thrust cylinder and operating levers, additional ropes, boom, bucket, tag line and trolley, and are readily made.

As a crane the 30-B has a capacity of 9¾ tons at a 20-ft. radius when mounted on caterpillars and 9 tons at the same radius when mounted on trucks or traction wheels. To make this change, the same parts are required as for the clam-shell machine, with the addition of the hook.

As a Dragline Excavator

To use this equipment with a dragline bucket the same changes are required with the exception that the tag line and trolley is not necessary and a fairlead, drag-bucket and rope must be ordered. The 30-B dragline supersedes the Class 7 Bucyrus dragline excavator. It carries a 1-cu. yd. bucket on a 35-ft. boom, or a ¾-cu. yd. bucket on a 40-ft. boom. The caterpillar mounting is recommended, but other types may be used if conditions require.

Mounted on Wheels and Serving as a Derrick Car

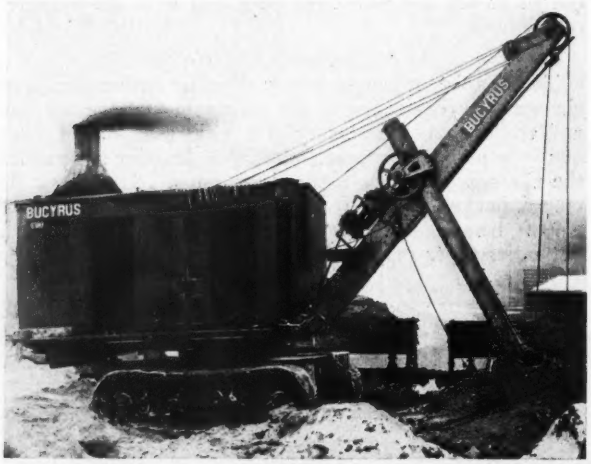
It often happens that the work requires an exceptionally high lift, as for loading wagons from deep excavation or for special work of some character. To fulfill this demand a 26-ft. boom and 17-ft. handle may be purchased. The design of this shovel contains a number of new features. These include a more rigid construction, an improved steam plant, engines and machinery firmly anchored and arranged for easy maintenance and convenience and ease of operation, a simplified operating lever arrangement, accessibility and a reduction in the number of working parts.

Caterpillar Traction

Caterpillar mounting for excavating machinery is not a new thing. It has been so successful that it is now an exception that a small shovel or dragline is sold with any other type of mounting. The saving of time and labor effected is great. It makes it possible for a shovel to move readily from one part of a job to another without calling upon the services of a large number of pit men to lay planks and to prepare the way. It enables the shovel

to do a small amount of excavation in one part of the job and then to move quickly to another and dig there. It may back away from blasts without loss of time and it can operate in flooded pits where ordinarily the entire plant would be idle. Furthermore, it can travel over muddy ground and climb steep grades with ease.

In the 30-B caterpillar the use of chains in the driving mechanism has been completely eliminated. Instead, driving is accomplished through direct gearing. The treads



In Use as a Revolving Steam Shovel

are entirely of cast steel with a large, smooth bearing surface, enabling the machine to travel over city streets, pavements and finished roads, without any danger of damaging the road surface and allowing extensive operation over rough ground without the continual necessity of renewing the treads. The elimination of the caterpillar frame not only adds to the simplicity and the strength, but permits easy access to the rollers, links and tumblers for purposes of inspection and maintenance. The machine may be turned easily in its own length.

SEAMS IN RAIL BASES

A NEW discussion of half-moon breaks in rail bases forms an important part of a report by the Interstate Commission Bureau of Safety on a derailment of a Chicago & North Western train at Lebanon, Wis., on February 25, 1918, caused by a rail failure. James E. Howard, engineer physicist of the commission, made a detailed study and report which forms an important part of the commission's bulletin on this accident. In this report Mr. Howard states that seaminess of the metal in the base of the rail has been responsible for all or nearly all half-moon fractures. Rails are affected by seaminess of the metal, both exterior and interior. Interior seams or streaks are contributory chiefly to fractures of the head of the rail; exterior seaminess to those of the base.

Interior streaks are believed to have their origin in the ingot. Upon this point most opinions are in accord. Divergent views are held in respect to the origin of exterior seaminess, some of which attach responsibility to the surface condition of the ingot; others attribute the cause to some stage in the process of manufacture.

A longitudinal crack usually begins at a surface seam. There are few, if any, exceptions to this rule. The seams in some rails may be obscure but nevertheless present. The central crack is diverted from its course, curves and extends to the edge of the flange. The line of rupture travels from the central seam toward the edge of the flange, never in reverse direction. The distance the line of rupture may follow a base seam ranges from less than 1 in. to 2 ft. or more. Half-moon fragments may be detached from either flange of the base, from the gage side or from the outside of the rail. It is not necessary that the rails should rest unevenly on the ties in order to induce base fractures. The contention that a crescent-shaped break is prima facie evidence of uneven bearing on the tie is not well supported by observation.

Base fractures of recent occurrence are numerous. In connection with the present investigation 748 rails were inspected which failed in this manner. Among this number was a group of 224, companion rails of the one which caused the present derailment. Surface seaminess on the base was a factor common to all which were critically examined. These failed rails represented the product of six mills, and had been in service on different divisions of seven railroads. Their weights ranged from 75 lb. per yd. to 107 lb. The periods of time in the track were from 4 months to 13 years. The progressive character of the fractures was equally apparent on those which failed in four months' time as on those of the longest duration in the track.

The cause or causes which lead to surface seaminess is a somewhat mooted affair. This defect has been variously ascribed to the original surface condition of the ingot, to the effects of breaking down passes of the blooming mill, to ragging of the rolls, and to an intermediate pass of the rail mill. Testimony has been to the effect that a modification in shape at one of the intermediate passes was attended with a favorable result. Laps in the base of the rail were traced to this particular pass and corrected by diminution of the depth of the concavity in the rolled shape, which in the finished rail had to be filled out to a flat surface.

The formation of mill scale, magnetic oxide of tangible thickness, obscures seamy lines, which are revealed by the acid of the pickling bath. The pickling of steel is not a new nor untried requirement in the inspection and acceptance of materials for engineering purposes. The pickling of a crop end of a rail, involving a minimum amount of labor, would reveal the condition of the surface obscured by the mill scale and show whether normal or unusual seaminess was present.

The fixing of wheel pressures is under control. They may be heavy or light, according to the will of the designer of the rolling stock, the establishing of which loads as such requires no special skill in the mechanical arts. Limitation of wheel pressures and elimination of seaminess in the steel, interior and exterior, are chief factors in the steel rail problem.

The report concluded with a brief summary by W. P. Borland, chief of the Bureau of Safety, in which he stated that this type of fracture of the rail is a common one, and therefore possesses interest from both the point of view of safety and from its economic importance. The reported number of rail failures due to half-moon base breaks is large. Ambiguity attaches to many rail failures which are reported as square breaks. There is reason for believing that an explicit description and report upon those rails which are now classified as square breaks would reveal a larger number of crescent-shaped base breaks than are being reported as such.

All or nearly all base fractures have been found to exhibit an initial seam at the undersurface, along the middle of the base. It is clearly evident that the elimination of this initial seam should result in an improvement and prolong the life of the rail. Efforts should therefore be directed and maintained to accomplish this result.

UNUSUAL LANDSLIDE ON ENGLISH RAILWAY

Heavy Slip Displaces a Massive Wall and Causes Upheaval of a Four-Track Roadbed

A SLIP OF UNUSUAL proportions in a cut on the Great Central Railway of England near London some time ago resulted in the blockade of a four-track line for a week. The conditions surrounding this accident and the manner of repairing the damage, as described in an article appearing in the Railway Gazette of London, affords such an intimate insight into English railway practices in meeting an unusually difficult problem in roadway maintenance that it is abstracted below, revised slightly to conform to American terminology:

The cut is situated on a line of the Great Central Railway near Wembley Hill station, about 6½ miles from London. It is nearly a mile long, with the station about midway of its length. The slip occurred in the portion lying to the west of the station in the position shown on the general plan. This end of the cut has a maximum depth of about 60 ft., measured on the center line of the railway, but as it is on a side hill the greatest depth at the top of the slope where the slip occurred is about 80 ft. above rail level. There are four tracks at this point, two main tracks in the center with a passing track on either side. The line is on a descending grade towards London.

The material through which the cut passes consists of

How the Roadbed Was Distorted

London clay, in which it was found necessary to adopt slopes of 3 to 1. In order to avoid the acquisition of the large amount of land and property which would otherwise have been required, it was decided to construct retaining walls for a considerable portion of the length of the cut alongside the roadbed, with slopes of 3 to 1 above their top. Accordingly walls were built on the uphill side for the whole distance between two public road bridges, a length of about 1,600 ft., and on the lower side for a portion of the distance only.

The wall on the upper side has a maximum height of about 31 ft. above roadbed level, and in the highest part has a maximum thickness of 14 ft. 7½ in. It was built in cement concrete faced with brickwork, the back of the wall being vertical and the face built on a batter of 1 in 8. The wall on the lower side is of smaller dimensions. These retaining walls were built in trenches, after the cut had been excavated to the level of the top of the walls. The remaining excavation between the walls

The Slide Produced a Bulge in the Retaining Wall

was not removed until after the completion of the masonry.

The cross-section at AA "previous to slip" shows the original surface of the ground, the position of the retaining walls and the 3-to-1 slopes. The walls were built tight up to the clay at the back of the trench, pockets 12 in. square being left in the backs of the walls at 10 ft. intervals for drainage. In these pockets 6-in. pipes with open joints were placed and covered with rubble, the lower ends being connected by pipe weepers passing through the wall to a drain constructed alongside the wall near the roadbed level.

The footings of the wall were carried down to a depth of about 8 ft. below subgrade into a hard blue clay which had every appearance of affording satisfactory foundations. To insure further stability of the walls, blocks of concrete 10 ft. long, 8 ft. wide and 14 ft. deep were constructed below the roadbed level in front of the foundations of the wall at frequent intervals along its length after the cut had been completed. A channel was formed in the concrete at the top of the wall behind the coping to catch the surface water from the cut slope, and this was connected at intervals to down pipes attached to the face of the wall.

Until the recent slip occurred no trouble whatever had been experienced with the walls since their construction in 1905, no sign of any movement or crack having been detected. Several years ago slight surface slips occurred in the slope of the cut above the top of the retaining wall on the high side. At that time the sliding material was removed and a system of rubble drains laid in the slope with a view to strengthening and draining it, and until February, 1918, no further trouble was experienced.

The first indication that any movement was taking place in the wall was obtained from a report of the per-

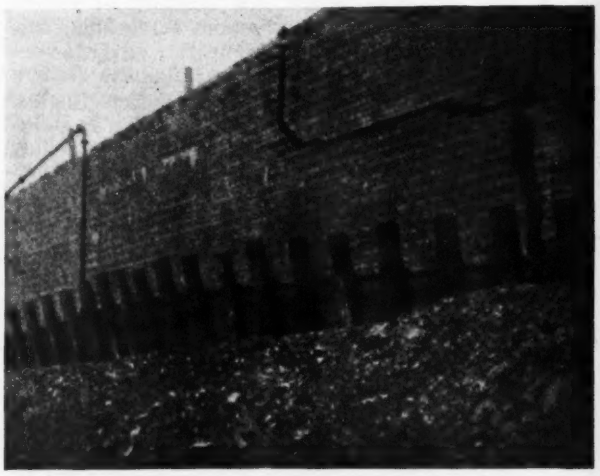
manent way inspector in February, 1918, that the outbound passing track alongside the wall was lifting. An examination was made at once and a series of measurements taken, from which it was found that a slight forward movement of a portion of the wall was taking place. This condition soon became so bad that it was found impossible to keep this track in surface and it had to be taken out of service. At the same time cracks began to appear in the ground about 10 ft. outside the top of the slope of the cut, from which it was evident that a movement of a serious nature was threatened. It was also noticed that a number of the short timber struts between the face of the wall and the small ballast wall forming the drain at the toe of the wall were undergoing very severe compression.

The wall was kept under close observation and arrangements were considered at once for stopping the traffic if necessary and during the evening of February 18, four days after the first indication of a movement, the wall for a length of 200 yd. moved forward bodily through a maximum distance of 20 ft. at the center, the ends remaining in their original positions. The ground at the top of the slope where the crack had been noticed sank some 15 ft., leaving a nearly vertical face in places.

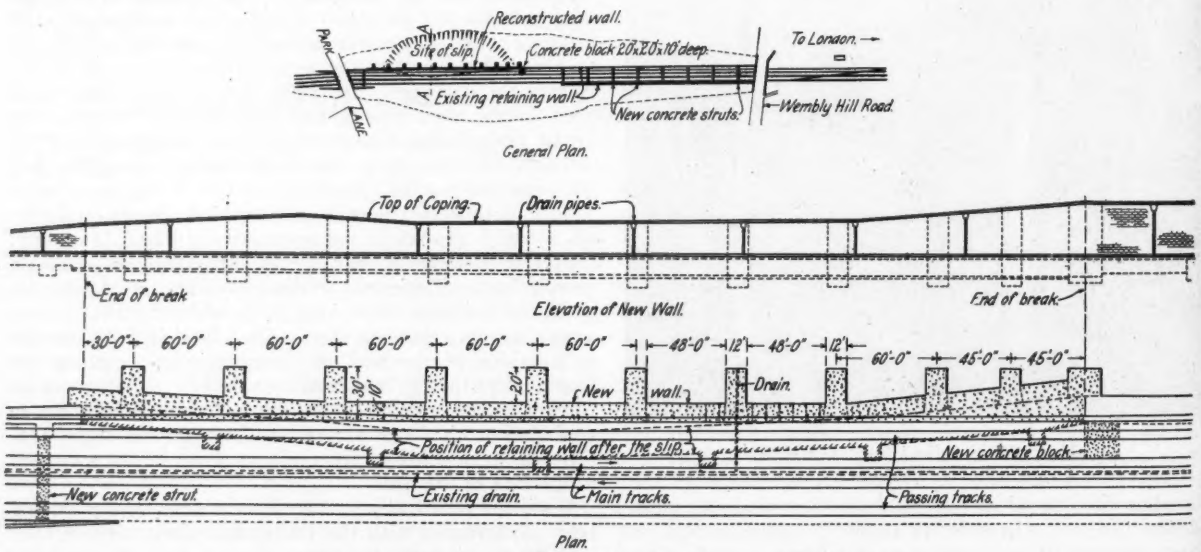
The whole movement took place in a few minutes, and was accompanied by loud reports as the wall cracked at each end and at the point of maximum movement. Some idea of the effect on the track will be gathered from the illustrations. As all four tracks were disturbed, all traffic on the line was diverted for some time. As soon as it became apparent that no further movement of the wall was to be expected, steps were taken to secure the safety of the portions not affected by the slip and also to reopen the line for traffic at the earliest possible moment.

Timber struts were inserted between the retaining wall and the wing wall of the bridge at Park Lane below the roadbed level. A contract was also awarded for the immediate construction of eight 6-ft. by 5-ft. concrete struts extending from wall to wall in the undisturbed portion and for a concrete block 20 ft. by 20 ft. by 10 ft. deep in the position shown on the general plan, with a view to preventing any movement taking place in the portion of the retaining wall between the east end of the slip and Wembley Hill road, which had so far not been affected. These struts are laid below track level, and suitable provision has been made in them for carrying all necessary drains through. The cross struts are reinforced with old rails. A concrete cross strut has also been laid as shown near the Park Lane bridge in place of the temporary timber one above mentioned. This work has so far proved effective in checking any movement in the remainder of the wall.

At the same time men were set to work to trim down the face of the slip in the ground above the wall and to flatten the slope. Meanwhile work was proceeding on the restoration of the tracks. As it was undesirable to remove any of the material heaped up in front of the old wall, it was decided to lay two tracks around the site of the slide, using the slope of the cut opposite the slip as found necessary. This entailed considerable filling, but good progress was made, and in seven days' time traffic in both directions was again resumed and has since proceeded without interruption. This work was done by the railway company's forces.



Ties Standing on End Next to the Wall



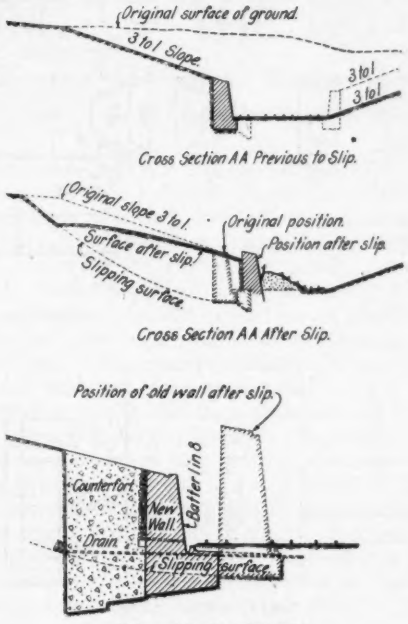
Where the Slip Occurred and How the Damage Was Repaired

It having been decided that the obstruction should be completely removed and four tracks again provided as soon as possible, arrangements were made for removing

the slide and reconstructing the retaining wall. An examination of the cross section appeared to indicate that the forward movement of the wall was due either to a breakdown in friction, the wall sliding forward on its foundation bed, or to a landslide on a bed possibly some distance below the wall foundation, the upright position of the wall and the almost complete absence of horizontal cracks showing that the wall itself was not at fault.

With a view to finding out what had actually occurred and where the sliding bed was, and also to break up the slide and relieve the earth pressure, it was decided to open pockets behind the old wall and put in 11 concrete counterforts. These counterforts are spaced 60 ft. apart and are 30 ft. long, measured from the face of the wall in its original position back into the slip. They are 12 ft. wide and vary in depth according to the height of the proposed new wall, and the nature of the material encountered in the foundations.

During the excavations a careful examination has been made of the ground passed through for any evidence of



Some Typical Sections

a sliding bed. The cross section shows the position of such a bed as indicated in one of the counterforts, which, it will be seen, extends from about the level of the foundations of the old wall, up towards the back of the excavation and probably follows the line indicated back into the cut to the surface of the slip. This material was of a very greasy nature, the sliding face being as bright as if polished with black lead. In each of the excavations so far carried out there have been indications of similar planes of non-adhesive surfaces. It appears, therefore, reasonable to assume that a line somewhat as indicated on cross section AA "after slip" defines the extent of the movement.

The enlarged cross-section shows one of the counterforts and also a section of the new retaining wall 10 ft. thick which will be built in between the counterforts on the original line of the wall with a face battered 1 in 8 to suit the existing wall at each end. As will be seen, the foundations are carried well below that of the old wall, and in all cases the concrete in the foundations is carried forward up to the back of the old wall, a portion of which below the track level will be left in to assist as an additional toe to the new wall.

The counterforts and new wall are being built in cement concrete, vertical at the back and with a face battered 1 in 8 to suit the existing wall. Where the existing wall fouls the line of the new wall at each end of the slip the new work will be left with a rough stepped face to enable the finished face of the wall to be securely bonded in when the old wall is cleared away. Old rails will be built into the new wall, tying it into the counterfort, and, as an additional safeguard, the counterfort is built in the form of a dovetail in front to receive the retaining wall on each side of it as shown on the large scale plan of the wall. Drains are being placed through the counterforts leading from the slipping surfaces at the back of the counterfort to the front of the wall and thence to the drain under the tracks.

The new wall is about 7 ft. less in height than the old one, and the slope of the cut above the new wall is being trimmed to slopes of 4 to 1 and 3 to 1. To effect this about 35,000 cu. yd. of material has been removed exclusive of the excavation in the counterforts and the new wall. This, together with 15,000 cu. yd. from the excavations for the counterforts, new wall, struts, etc., totals some 50,000 cu. yd. The total quantity of concrete in the new wall, counterforts and struts is approximately 11,000 cu. yd.

On the completion of the new wall, the old wall and debris in front will be cleared away to the roadbed level, and the four lines of track reinstated in their original position. The work is being carried out by contract according to designs prepared under the supervision of Harry Blundell, chief engineer, and the immediate superintendence of S. L. Murgatroyd, permanent way engineer of the Great Central Railway.

THE ACTION OF BALLAST IN TRACK*

THE FOLLOWING observations summarize in a way some of the results of the tests and analysis and bring out in part the phenomena attending the transmission of pressure from the tie through the ballast.

The bearing pressure of the tie varies in intensity from its edge to its middle line; the maximum intensity is dependent upon the intensity of pressure developed at the edge. A variation in intensity exists also along the length of the tie. The pressures which react from the lower face of the tie act in other than vertical lines, the greatest variation from the vertical direction being at the edge of the tie. There is a concentration of pressure a short distance below the tie, say at 3 to 4 inches, and the intensity of pressure in the ballast at such a depth is greater than exists at the bottom of the tie.

For the tie of ordinary width the intensity of pressure at a depth of 6 inches and the distribution of vertical pressure over a horizontal plane at this depth do not differ greatly from those existing immediately under the tie. The directions of the pressures are not the same. At or below this depth the distribution of pressure laterally begins, with a consequent decrease in maximum intensity of pressure, and the change becomes more apparent as the depth increases.

The foregoing relates to the transmission of pressure from a single tie. For a number of ties with the ordinary tie spacing, the effect of the combination of pressures transmitted is readily found by superposing the values of the pressures from the several ties as obtained for a plane at the same depth. For the ordinary width of tie

*From the report of the Joint Committee on Stresses in Track, published in the Proceedings of the American Society of Civil Engineers for February, 1920, and Bulletin 224 of the American Railway Engineering Association.

the effect of the pressure transmitted from the adjacent tie to points midway between ties is noticeable at a depth equal to about half of the usual tie spacing. At a depth of three-fourths of the ordinary tie spacing the pressure immediately under the center of the tie is about one and one-half times that resulting from a uniform distribution over the horizontal plane. At a depth equal to the ordinary tie spacing the lateral distribution has become such that the variation in intensity of pressure from tie to tie is small.

The variation in intensity of pressure in the ballast lengthwise of the tie (which is dependent upon size and stiffness of tie, quality of tamping, and condition of the bed on which the tie rests) becomes less and less with increase in depth, and it may be expected that the variations will be smoothed out at a depth equal to the ordinary tie spacing, or a few inches below, where there will be a fairly uniform pressure over the horizontal plane. The tests were made on a rigid base and the results may be expected to apply to a firm roadbed capable of carrying the loads transmitted. A depth of ballast greater than that named would be found useful when the roadbed is of uneven character or yields under the load or is subjected to unusually heavy load.

The tests show that for quiescent loading there is little difference in the manner and rate of transmission and distribution of pressure for broken stone, pebbles and sand ballasts; that is, at a given depth the intensities of pressure will be approximately the same, provided, of course, the ultimate carrying capacity of the ballast is not exceeded; and this conclusion may properly be extended to other non-cohesive materials. It will require less load to force the tie into sand ballast than into broken stone; the ultimate carrying capacity of the broken stone ballast under tie pressure is much greater than that of the sand ballast—the particles of sand ballast are more easily moved and rearrange themselves under lighter loads. For the different kinds of ballast there are great differences in the ultimate load which can be carried on a tie before ballast movement begins. The ultimate carrying capacity depends upon size of particle, smoothness of surface and degree of angularity. A material whose mobility under pressure is increased by the addition of water or by mixture with other materials may thereby have its carrying capacity decreased. For heavy loading the ultimate carrying capacity of a ballast material is especially important.

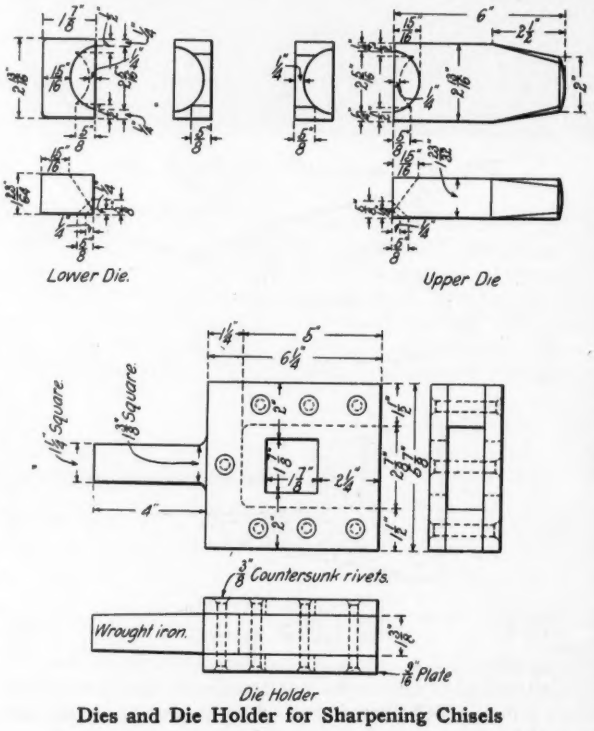
It is evident that a principal function of the ballast immediately under the tie and for some distance down, aside from such functions as drainage, is to carry the load without material lateral movement of the ballast to that depth at which lateral distribution becomes effective. An advantage of the coarser, rougher kinds of ballast is that they will carry a greater ultimate load—which is of special importance in the upper part of the ballast. This is especially true under the jarring, vibrating loads of track service for which the ultimate carrying capacity naturally will be less than that found under the quiescent loads used in the tests.

The tests in the laboratory indicate, as would be expected also from analytical considerations, that the presence of ballast above the level of the bottom of the tie may have little influence on the quiescent load which will be carried before the ballast will work out from under the tie allowing it to settle, but that under repeated applications of load and particularly under jarring and vibratory loads the ultimate carrying capacity of the ballast is considerably increased by raising the level of the ballast surface to the top of the tie. This advantage is particularly apparent at the end of the tie, where under the whipping action of the tis under repeated deflections, the particles of ballast will more readily be pushed away, since beyond the end of the tie there is no part of the track structure available for resisting the lateral pressure as is the case in the direction of the track, where another tie is always near at hand.

It seems probable that the effect of the jarring action of train loads will be to decrease the lateral distribution of pressure. It seems possible also that this tendency is counteracted in some degree by the cohesion which develops in ballast after it has been in place for some time.

RESTORING THE CUTTING EDGES ON TRACK CHISELS

A NEW METHOD for dressing track chisels has been developed at the Shoreham shops of the Minneapolis, St. Paul & Sault Sainte Marie, where these chisels are sent by the track forces for renewal. Instead of grinding down the damaged edge a sufficient amount to produce a new one, the chisel is cut off between specially formed dies that produce a new edge in one operation.



Dies and Die Holder for Sharpening Chisels

As a consequence, little if any grinding is necessary, so that a considerable saving of labor is accomplished while the danger of burning the chisel while grinding is practically eliminated.

The equipment required for this purpose consists of three pieces, two dies and a die holder or guide. The latter consists of a wrought iron box designed to stand on the anvil in an upright position. This guide contains a chamber, open at the top, into which the two dies can be inserted in the proper order, while on one side is a square hole into which the end of the chisel is introduced.

With the lower die in proper position in the guide, the end of the chisel is inserted through the opening provided for it in the side of the guide. The upper die is then placed in position and, when struck a blow with a hammer, the edge of the chisel is cut off between the two dies, which have cutting edges of such shape that a perfect new chisel edge is formed in the single operation.

LINING UP THE ROADS FOR PRIVATE OPERATION

President Wilson Has Designated Director-General Hines as His Agent to Settle Up Affairs of Government Control

Washington, D. C.

PRESIDENT WILSON signed the Esch-Cummins railroad bill on February 28 and the railroads which had been operated by the government for 26 months were relinquished on March 1 both by the terms of the law and by the President's proclamation of December 24, under which all preparations had been made for returning the railroads regardless of the legislation. The President also issued an order designating Director General Hines as his agent to settle up the affairs of federal control and that part of the staff of the Railroad Administration which has been retained since March 1 has been organized for the purpose of liquidating the various claims and accounts between the government and the railroads and others, among the most important of which are the claims involving the questions as to whether or not the government owes the carriers for deferred maintenance and the amounts, whether expenditures made by the government are properly chargeable to maintenance or capital account or as to how they shall be divided in the case of expenditures in connection with unification.

The staff retained by the Railroad Administration after the return of the railroads on March 1 to liquidate its affairs includes approximately 1,223 officers and employees, according to a statement issued by Director General Hines to indicate more definitely than was possible in his annual report the steps taken and in contemplation to conclude the matters arising out of government operation of the railroads. Because so many people continued after March 1 to take to the Railroad Administration requests for information, appeals for the expedition of shipments, complaints, etc., such as they had been used to take up with its organization, Mr. Hines also took occasion to state that he is no longer in charge of railroad operation.

Director General Hines' Statement

"In accordance with the transportation act and with the President's proclamation," Mr. Hines said, "the director general ceased to have any control over the operation of the railroads on March 1, and coincidentally the regional and district offices and terminal organizations of the Railroad Administration and the divisions of operation, traffic, public service, inland waterways and labor ceased to function as such. Following out notices which have been given in advance, approximately 891 officers and employees of the regional and terminal district organizations ended their employment with the Railroad Administration on March 1, and at the same time approximately 529 officers and employees of the central administration ended their connection with the Railroad Administration, making a total of 1,420 officers and employees who were taken off the government payroll on March 1. A large proportion of the officers and employees released have resumed employment with railroads.

"In addition to the 1,420 officers and employees of the regional and central offices of the Railroad Administration released on March 1, a considerable additional number will be released in the near future, it having been necessary to retain some employees of the regional offices and of the central divisions which have been abolished for a comparatively brief time to complete the records of federal control and wind up the work of those offices.

"Under the proclamations of the President dated February 26, in accordance with the terms of the transportation act, the director general was authorized to liquidate the affairs of the government control of railroads. The annual gross revenues of the railroads under government control in 1919 were in excess of $5,000,000,000 and under government control as under private control the railroad operation accounts involving such large amounts are not available day by day, but are always from 30 to 90 days behind. For 26 months, properties, privately owned, including approximately 240,000 miles of main line of railroad which, with its equipment, are variously estimated as being worth from $15,000,000,000 to $20,000,000,000, have been under the control of the government on a rental basis of about $917,000,000 per annum. In addition to the actual operation of these properties during federal control, the Railroad Administration has been engaged in agreeing upon the standard form of contract to be made with each railroad company, the adaption of that form to the particular condition of each company, in agreeing upon the rental to be paid each company, consideration of the materials and supplies received and of the corresponding amounts to be returned at the end of federal control, determination of the extent to which the corporations would be charged for capital expendi-

tures made for additions and betterments and equipment and manner in which payment therefor should be made, determination of the mutual rights of the parties as to over maintenance or under maintenance of the properties and consideration of many other problems which considered together have presented a task of very considerable proportions.

"The final adjustment of questions growing out of these large transactions will call for attention for a considerable period in the future. There will be involved a large number of claims of the railroad corporations against the government and of the government against railroad corporations relating to capital expenditures made during the federal control, maintenance questions and other problems. Numerous financial, accounting and legal questions must be disposed of and in addition the government will have to supervise payments of claims from shippers on account of loss and damage and overcharge claims and also personal injury claims arising during the period of federal control, such claims, of course, being claims against the government. These activities will necessitate a very large number of detailed inquiries calling for investigation and adjustment of railroad records throughout the country and for the present will require a very substantial force.

"As of March 1 and after eliminating the 1,420 officers and employees mentioned the central administration included approximately 1,072 officers and employees and the regional offices of the Railroad Administration included approximately 151 officers and employees, or a total of approximately 1,223 officers and employees. The employees who have been retained in the regional offices represent primarily employees who have been retained as field agents and office clerks of the central organization of the Railroad Administration to assist in the liquidation of the claims mentioned above."

The Committee on Claims will be known as the Advisory Committee on Claims, while the Sub-Committee on Claims will be known as the Committee on Claims. The membership of the Committee on Claims will be as follows: George M. Huss, assistant engineer in the Division of Capital Expenditures, Division of Liquidation Claims, chairman; E. M. Durham, Jr., chief engineer construction, Southern Railway, manager, Department of Ways and Structures, Division of Liquidation Claims; Frank McManamy, assistant director, division of operation, manager, Department of Equipment, Division of Liquidation Claims; E. M. Alvord, Division of Liquidation Claims; P. E. Wooley, office of comptroller, and a representative to be appointed by the director, Division of Law.

E. M. Durham, Jr., manager of the Department of Ways and Structures of the Division of Liquidation Claims, has appointed regional engineers for each of the regions maintained by the Railroad Administration, as follows: C. E. Knickerbocker, senior assistant to the engineering assistant of the Eastern region, has been appointed regional engineer for the Eastern region, with headquarters at the Grand Central Terminal, New York City. David Meriwether, Jr., assistant to the chief engineer of construction of the Southern Railway, has been appointed regional engineer for the Allegheny region, with headquarters in Broad Street Station, Philadelphia. H. M. Rodenbaugh, engineering assistant to the Southern regional director, has been appointed regional engineer for the Southern and Pocahontas regions, with headquarters in the Hurley-Wright building, Washington, D. C. Horace Stringfellow, district engineer of construction of the Southern Railway, has been appointed regional engineer for the Southwestern region, with headquarters in the Railway Exchange Building, St. Louis. F. H. McGuigan, Jr., assistant engineer in the office of the engineering assistant of the Central Western region, has been appointed acting regional engineer for that region, with headquarters at 547 West Jackson boulevard, Chicago. C. K. Smith, acting engineering assistant for the Northwestern region, has been appointed acting regional engineer for that region, with headquarters at 547 West Jackson boulevard, Chicago.

In his annual report to the President, Director General Hines included the following statement regarding maintenance:

"As to maintenance of way and structures, it is believed that, on the general average, the government has closely approximated compliance with its contract obligation to return the properties in substantially as good condition as when received. On some railroads there has been, especially in 1918, a shortage in the amount of rail, ties or ballast applied in maintenance of the property, this being due to shortage of material and labor, and in various instances it was not practicable in 1919 to make up entirely the shortage which occurred in 1918. But when the proposition is viewed as a whole and consideration is given to the amounts of other kinds of maintenance, it is believed the general statement of approximate compliance with the contracts of the railroads as a whole is correct. Undoubtedly there will be cases where claims for undermaintenance will be allowed and in other cases claims for overmaintenance can be sustained.

"From the standpoint of the condition for current operation the roadway and structures are in good working condition, have carried a large traffic for many months and are capable of continuing to do so."

The threatened strike of the maintenance of way employees, originally set for February 17 and postponed at that time at the request of the President, was again postponed indefinitely after a meeting of the officers and committeemen of the brotherhood of maintenance of way employees in Chicago on March 4, and A. E. Barker, president of the brotherhood, finally became a member of the conference committee representing the various railroad labor organizations which met at Washington on March 11 with a committee representing the railroads, at the request of the President, for the purpose of discussing the general wage demands which were presented to but not acted upon by the Railroad Administration. The maintenance of way organization did not agree to join in this conference until after considerable pressure had been brought to bear on it by the other organizations, who took the position that a strike on the part of any labor union, in the face of the efforts made by the President to have the wage question adjudicated under the provisions of the new law, would be opposed to the interests of the labor organizations as a whole.

The law makes it the duty of the railroads and their employees to first attempt to settle wage questions by conference, after which they may be referred to a board of adjustment or to the Railroad Labor Board established by the law, and this board in any event has the power to review any agreement reached for the purpose of protecting the public interest.

The conference adjourned on March 11 to meet again on March 22.

COST OF ACQUISITION OF LANDS MUST BE CONSIDERED IN VALUATION

The United States Supreme Court rendered an important decision on March 8 affecting the railroad valuation proceedings by reversing decrees of the Court of Appeals and of the Supreme Court of the District of Columbia, which had in effect dismissed the petition of the Kansas City Southern for a writ of mandamus to require the Interstate Commerce Commission to find the

present cost of acquisition of its carrier lands. The case is of importance because it will require the commission to take into consideration the cost of acquisition of lands in the other cases and it will probably, therefore, delay the service of some tentative valuations which have been held back pending the decision until the additional information is compiled.

In the Texas Midland case the commission said that the present value of lands was stated by ascertaining the number of acres and multiplying this by a market value determined from the present fair average market value of similar adjacent and adjoining lands, making due allowance for any special value by reason of the peculiar adaptability of the lands for railroad use, but adding nothing additional for the expense of acquisition, for severance damages, for engineering or interest during construction. The same method was also employed in valuing the lands of the Kansas City Southern.

The carrier introduced evidence to show land values in one county along its lines which did not vary in essential particulars from testimony of a like character which had been introduced in the Texas Midland case. After receiving this testimony the commission declined to permit the introduction of evidence of the same kind for other lands of the carrier. At the final hearing in the Kansas City Southern case counsel for the railroad filed an affidavit and motion asking leave to present the further evidence, which motion was denied by the commission. Thereafter a mandamus proceeding was brought in the Supreme Court of the District of Columbia to compel the commission to receive evidence, to enable it to ascertain and report separately the "present cost of condemnation and damages or of the purchase in excess of original cost on present value" of the lands included in the rights of way, yards and terminals of such carriers. The railroad rested its case upon the provision of Section 19-A of the valuation act, which provides that the commission's investigation and report shall state in detail and separately, present improvements, original cost of all lands, rights of way and terminals owned or used for the purpose of a common carrier, ascertained as to the time of dedication to public use and the present value of the same, and "separately the original and present cost of condemnation and damages or of purchase in excess of such original cost or present value."

The Supreme Court of the District of Columbia dismissed the proceedings and an appeal was taken. The case was argued before the Supreme Court on December 10 by counsel for the Kansas City Southern and the chief counsel for the Interstate Commerce Commission and brief *amici curiæ* was filed for the President's Conference Committee on behalf of all the railroads.

Ditching With a Spreader Car

THE GULF, FLORIDA & ALABAMA has used a spreader car with ditch-forming attachments to form side ditches on a large part of its mileage with very excellent results and it is believed that an account of the methods followed will be of interest. This road extends from the Port of Pensacola, Fla., to a connection with the Southern at Kimbrough, Ala. The line is composed of four different types of construction, having been built at different times and with different standards. The character of soil varies from ocean sand to the most extreme type of blue gumbo.

Ditches Completed Through a Wooded Tract

A portion of the line was purchased from a lumber concern and was the typical logging railroad, laid practically on top of the ground, with shallow cuts and fills, and very little attention had been given to the question of drainage for its entire length. In many places the track had become practically a pond for standing water, making track maintenance very expensive. It was, therefore, necessary to consider some rapid and inexpensive method of ditching which could be carried out with the minimum of labor, and after considering several other methods it was decided to use the ditching attachment for a Jordan spreader, such as was described in the *Railway Maintenance Engineer* for November, 1919, page 409. As explained in this article, the ditching wings are designed as to replace the regular wings and can be placed in approximately three hours by the use of a derrick. This spreader with the ditching attachment can be easily handled by a locomotive at the rate of 10 miles per hour over track which has never been ditched. Where new ditches are made it is necessary to go over the ground from two to four times, depending largely upon the character of the soil. Ditches can easily be completed at the rate of 2½ miles per hour.

The photographs show the condition of ditches four months after they were completed. The material excavated from the ditches forms a bank at the side and packs very hard, so that practically no wash is experienced; in fact, no more so than if made as an original cut. In operating through heart pine timber lands it was necessady to remove stumps before ditching, but through soft wood country stumps can be plowed out with the ditching arm.

The cost of ditching, including all expenses incident thereto, did not exceed $35 per mile, this high expense being due largely to the fact that no ditches existed previously. Delay in removal of stumps was also a contributing cause. After the ditches have once been formed it should be possible to clean them out easily at a speed of 50 to 70 miles per day, with a cost not exceeding $3 per mile, and if cleaned once each year the drainage would require practically no attention on the part of track foreman.

The ditching attachment works easily in making new ditches through cuts up to four feet in depth, and where

there is sufficient room to open the ditching arm, will work in cuts of any depth, carrying the material to the end of the cut for disposal. The ditching arm, operated by air, does not require stopping the work train at bridge ends, road crossings, or other obstructions, as the operator simply applies the air and arm is lifted and pulled in parallel to the car so that it is entirely in the clear. The ditching arm is so formed as not to interfere with ballast sections.

Appearance of the Ditches in Open Country

FALSE BOTTOMS FOR LEAKY TANKS

By W. A. Batey

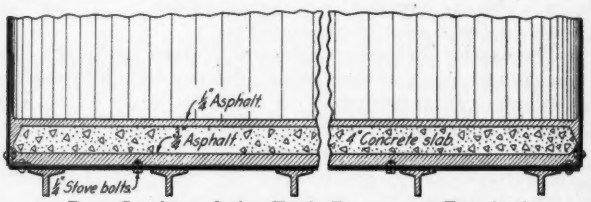
Supervisor of Bridges and Buildings, Union Pacific, Kansas City, Mo.

THE USE of false bottoms made from concrete and asphalt has been found to be a satisfactory means of stopping the leaks of a number of steel tanks installed on the Kansas division of the Union Pacific. These tanks are of the flat-bottom type, of 65,000-gal. capacity, and are supported on steel columns. The first one to develop a leaky bottom was built in 1905, being painted at that time with two coats of red lead and oil with another coat applied in 1910. Early in 1915 small leaks appeared in the bottom, which were plugged temporarily with soft copper and wooden plugs, but in the following year the tank was found to be leaking so badly that it became necessary to install a false bottom.

When drained, thoroughly scraped and cleaned, the entire bottom of the tank and three inches up on the side sheet were found to be deeply pitted and in places the bottom sheet was so thin as to sag between the supporting I-beam sills which were spaced on 18-in. centers. While no chemical analysis of the water was made at this time, a considerable amount of foaming in locomotives had been reported during the period preceding, and a deposit of foreign material about two inches deep was found on the floor of the tank. This was of a bluish color and of a plastic composition.

Before any repairs could be undertaken upon the tank it was necessary to plug about 378 holes, for which ¼-in. stove bolts were used, each having a rubber washer at the top and bottom of the sheet, as it was found that the asphalt would force its way through even a very small hole when under pressure. A layer of hot asphalt was then applied to the floor and spread to a thickness of about ¾ in., while the side sheets were coated to a height of about 12 in. from the bottom, the balance of the sides being painted with red lead and oil. A 4-in. slab of rich concrete was then poured on the ¾-in. layer of asphalt and before it had time to set a trowel was run around the edge of the concrete, forcing it back from the side sheets to form a wedge-shaped opening measuring about ¾ in. wide at the top, which could be kept full of asphalt. After the concrete had set a ¼-in. coating of hot asphalt was poured over the entire slab and precautions were taken to insure that the wedge at the outside edge was run full.

The concrete slab, in conjunction with the asphalt, has served both to waterproof the tank bottom and to strengthen it by removing the strain from the thin places on the bottom sheet where they showed sag between the supports. This tank has given no further trouble and during the past year four more tanks in a similar condition have been repaired in the same manner with equally good results. Coal tar or pitch has not proved to be a satisfactory substitute for asphalt, as climatic changes and vibration will cause either of them to crack and thus let the water through to the lower sheet.

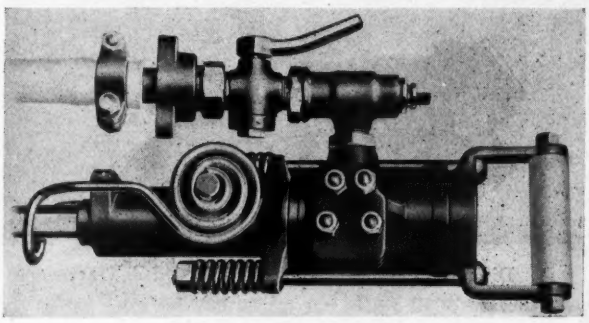


Part Section of the Tank Bottom as Repaired

Three of the tanks repaired this year were at important water stations, but the work was so arranged that, by assembling all necessary material, etc., beforehand, they were not out of commission longer than from 72 to 96 hr. Little or no delay to train service was experienced, as the work was done during the period of least traffic, while adjacent tanks were kept full of water, although in a few instances it became necessary to pump directly into the engine tank where a train could not make the next water station.

A NEW "JACKHAMMER" DRILL

THE INGERSOLL-RAND COMPANY, New York, has recently developed a new light, self-rotating hammer drill for use in locations and positions where it is not possible to use a heavier machine. The new drill is considerably smaller and lighter than similar appliances in the "Jackhammer" group of hand hammer drills manufactured by this company, weighing but 21½ lb., as compared with 35, 41 and 70 lb. for the other machines in the same group.



The New Light Weight Drill

This drill was designed particularly for bench and pop work in soft lime stone quarries and for drilling holes in concrete and masonry foundations. It is not adaptable or recommended for drilling deep holes or for use in hard rock. The character of the new drill is clearly shown in the photograph on the preceding page.

Economical Disposal of Waste Materials*

BY MAJOR HOWARD L. BEACH

THE QUESTION of the disposal of waste materials is one that has been more or less under discussion for many years. Only recently, however, has it become so acute as to demand special consideration. Among the causes which have contributed to make this a matter of ever increasing importance may be mentioned that: (1) Waste materials, particularly slag, ashes, etc., are no longer in great demand by railroads for new construction; (2) lowlands adjacent to waste material-producing industries have been filled or otherwise utilized, making longer hauls necessary; (3) the increasing shortage of labor; (4) the periodical shortages of cars. Due to these conditions, the wasting of this material has become a burden keenly felt by the railroads, and in addition is a source of actual loss in revenue.

In handling revenue-producing commodities there arise costs of various natures, such as those for loading, hauling, switching and unloading. The reduction of these costs has been given careful attention, as evidenced by the many labor-saving devices employed for handling such commodities. In the coal industry expensive tipples have been erected so that cars may run from the mine to chutes and dump directly into the cars without labor. Special cars have been produced for mine service so that no labor will be required to get the coal out of them. The coal is even graded mechanically. Hauling costs have been reduced by designing special cars for coal service and each year sees larger and more efficient cars in use. Locomotive design has been given great attention to get hauling units of the largest practical size to increase the tonnage of trains and reduce the labor required to haul the coal. At the consignee's end of the line much money has been spent to provide trestles and chutes allowing the cars to discharge the coal directly into hoppers with a minimum of labor. This has even been carried out in small towns where the coal dealer builds a timber trestle and then buys auto trucks with special dumping bodies that will spill the coal down a sidewalk manhole and save the man with the shovel.

In the ore trade, large and powerful devices have been made for taking ore out of vessels and placing it directly in railroad equipment without the use of the shovel. This labor-saving work does not start here, but back at the mine where great attention has been given the design of steam shovels for loading, and cars that will bring the ore from the mine to the lake front and load direct into steamers with only such labor as is required to trip latches on the cars and open doors from the ore bins, allowing the contents to run into the boats.

After it is mechanically unloaded from the boats into cars the ore is transported to the furnaces where machines are provided which are capable of picking up a car bodily and dumping it over, spilling the contents either into specially designed transfer cars which deliver direct to the skip hoists feeding the furnaces or to the ore bridges which place the ore on the stock piles.

While the same elements of cost encountered in handling revenue-producing commodities are present in the handling of waste, generally speaking, it is loaded into the same class of cars that would be used were it going to a car dumper. But instead of going to such a place it goes to some out of the way hollow and is thrown over the bank. No car dumper is available, no locomotive crane handy, so a lot of labor is transported at large maintenance expense and the waste mauled out of the cars as best it can be. Since labor for unloading is the largest single item of cost, attention is being turned in this direction, with the result that in a number of places special equipment is being considered and in some places is already in operation.

The Lehigh Coal & Navigation Company was one of the first to recognize the value of efficient dumping equipment in waste disposal. This company handles large quantities of rock waste daily, which is entirely too large to handle in hopper cars, pieces often being several feet across and comparable to large slag skulls from open hearth furnaces. In order that this waste might be handled to the best advantage several miles of track have been changed from narrow to standard gage to permit the use of the largest dump cars obtainable. At one operation the company has three rock trains working. Each train consists of a locomotive and two cars, and each train makes between 25 and 30 trips every day. The cars carry 50 tons of rock each, which means that between 7,500 and 9,000 tons of rock are dumped every day. The entire labor force for this work consists of two men on each train, a foreman and nine laborers to keep the track on the dump in shape, and two men on the loading chutes. Figuring $4 per day per man, or $72 for the gang, the labor on 7,500 tons dumped is less than one cent per ton.

In the Pittsburgh district, including Wheeling and New Castle, there originate each day 600 to 700 carloads of waste material. About 90 per cent of it is loaded into gondolas and hopper cars. The average time consumed in good weather from the delivery of the carload to the railroads to returning it empty to the railroads for other use is five days, and there are from 2,000 to 5,000 cars tied up all the time in disposing of waste material. The average time, under favorable conditions, that a car is on the dump being unloaded or waiting an opportunity for unloading is two days. The railroads, therefore, consume at least three days in their movement.

It costs the railroads 75 cents a ton to handle this material with their present equipment. They receive 25 cents a ton for granulated slag and ashes, and 44 cents for heavier material such as brickbats and open hearth slag. They are, therefore, working at a direct loss of from 31 cents to 50 cents a ton, or an average of 41 cents per car. In addition to this a large quantity of equipment is tied up and kept out of regular freight service. In the winter of 1917-1918 there were as many as 9,000 cars in this district under waste material load, and the average time the car was in this service was from nine to ten days. To be sure, this was a war time condition, but unfortunately a recurrence of this condition in active peace times is easily probable.

One thousand dump cars handled on a scheduled cycle would care for all the waste produced in the Pittsburgh district to-day, and not only release for other service

*Abstracted from a paper presented recently before the Railway Club of Pittsburgh.

from 2,500 to 9,000 gondolas and hoppers, but eliminate all the labor now employed on the waste dumps for cleaning the cars, leaving only a small gang to shift and level the track as required. That such a service is practical is readily illustrated by reference to classified freight service in many other lines. Refrigerator cars are used for perishable goods only, except in rare cases of extreme car shortages. Box cars are made to accommodate a certain class of material, as instanced by automobile cars and grain cars. A grain car is never loaded with coal, but is kept clean for its intended commodity.

It is, of course, desirable to have loads in cars whenever moved, and the argument is often put forth that cars coming to the plants loaded with ore, coal and limestone should be shipped out loaded. But if they are never to be moved without a load, what shall we put in them on the waste dump? To haul to the waste dump seldom exceeds 30 miles. If it is economical to haul empty cars 75 miles from the valley furnaces to the lakes to maintain a scheduled cycle of operation, how much more economical it should be to haul empty cars 30 miles from a waste dump to the mill. As a matter of fact, this is actually done, for the cars from the waste dump must go somewhere for a load. They usually go to a big distribution yard, where they are shunted around for a day or so and then head into a coal mine, sand bank or quarry for a load.

With the short haul obtainable for waste material disposal there should be no excuse for waste cars going into distribution yards at all. The "slag special" can gather, as it goes out, move to the dump, and spot directly on its return trip, thus saving time in every movement. The engine does not even become uncoupled from the train on the dump, but returns the cars it takes out.

CALCULATING THE VOLUME OF PILES AND POLES

IT OFTEN becomes desirable to ascertain the volume of piles and poles, as, for instance, in the determination of the amount of preservative absorbed per cubic foot of timber. In order to faciltiate this, the following table was compiled by the Forest Products Laboratory, Madison, Wis., the values given being computed by the cone-frustum formula, $V = 0.2618\ L \frac{(D^2 + d^2 + dD)}{144}$, where V is the volume, L the length, D the top diameter and d the butt diameter. The middle diameter is obtained by averaging the two end diameters.

This table is entirely accurate, only for poles of a uniform taper, but errors from such sources as irregular shape and large checks may be lessened if measurements are taken at short intervals and the volume of each section computed separately. In using the table care should be taken in finding the average diameter of each end when they are not true circles, then, to find the volume desired, multiply the number in the table corresponding to these two diameters by the length of the pile in feet. The result is the volume in cubic feet.

EARTH SLIDES, THEIR CURE AND PREVENTION

By C. H. CARPENTER

EARTH SLIDES are a source of annoyance and heavy expense on almost every railroad. They cause heavy and costly delays to important traffic and much good labor is lost in removing them in bad weather and during night hours. For this reason, if there is a cure and prevention for earth slides it is of the highest importance that it be applied.

The first thing that should be done is to determine the cause of the slide and the next thing is to apply the proper antidote. Slides are caused by masses of earth becoming separated and hanging on slopes steeper than the plane of friction, water being the lubricator of the sliding mass. In fact, earth would not slide at all, except in obedience to the law of gravitation, if it were not for the action of water. Therefore the cure for slides is to get rid of that factor and there is hardly a slide that cannot be eliminated by proper drainage.

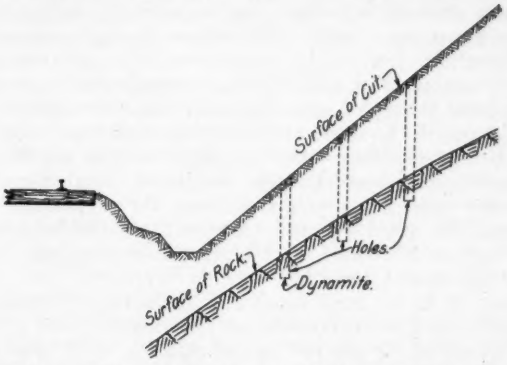
The nature of the earth and the formation of the rock strata must be studied thoroughly, for upon a superficial inspection an earth slide might appear to be practically dry, although on going well up the slope and behind it, soggy patches will be found. It is the water from these soggy places seeping through the ground to the base of the part broken away that causes the trouble. Good drainage ditches must be provided far above the slide to carry the water away as far as possible on the surface and prevent it from percolating through to the sliding mass. The base of the slide at the track should also be well

TABLE FOR CALCULATING CUBICAL CONTENTS

Large Diameter (In Inches)	Small Diameter (in Inches)																		
	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5	12	12.5	13
6	.14	.15	.17	.18															
6.5	.15	.17	.18	.20	.21														
7	.17	.18	.20	.21	.23	.25													
7.5	.19	.20	.22	.23	.25	.27	.29												
8	.20	.22	.23	.25	.27	.29	.31	.33											
8.5	.22	.24	.25	.27	.29	.31	.33	.35	.37										
9	.24	.26	.27	.29	.31	.33	.35	.37	.39	.42									
9.5	.26	.28	.30	.31	.33	.35	.37	.40	.42	.44	.47								
10	.28	.30	.32	.34	.36	.38	.40	.42	.44	.47	.49	.52							
10.5	.31	.32	.34	.36	.38	.40	.42	.45	.47	.49	.52	.54	.57						
11	.33	.35	.37	.38	.41	.43	.45	.47	.50	.52	.55	.57	.60	.63					
11.5	.35	.37	.39	.41	.43	.45	.48	.50	.52	.55	.58	.60	.63	.66	.69				
12	.38	.40	.42	.44	.46	.48	.50	.53	.55	.58	.61	.63	.66	.69	.72	.75			
12.5	.40	.42	.44	.46	.49	.51	.53	.56	.58	.61	.64	.66	.69	.72	.75	.79	.82		
13	.43	.45	.47	.49	.51	.54	.56	.59	.61	.64	.67	.69	.73	.76	.79	.82	.85	.89	
13.5	.46	.48	.50	.52	.54	.57	.59	.62	.64	.67	.70	.73	.76	.79	.82	.85	.89	.92	.96
14	.49	.51	.53	.55	.57	.60	.62	.65	.68	.70	.73	.76	.79	.82	.86	.89	.92	.96	.99
14.5	.52	.54	.56	.58	.61	.63	.66	.68	.71	.74	.77	.80	.83	.86	.89	.93	.96	1.00	1.03
15	.55	.57	.59	.61	.64	.66	.69	.72	.74	.77	.80	.83	.86	.90	.93	.96	1.00	1.03	1.07
15.5	.58	.60	.62	.65	.67	.70	.72	.75	.78	.81	.84	.87	.90	.93	.97	1.00	1.04	1.07	1.11
16	.61	.63	.66	.68	.71	.73	.76	.79	.81	.84	.87	.91	.94	.97	1.01	1.04	1.08	1.11	1.15
16.5	.64	.67	.69	.71	.74	.77	.79	.82	.85	.88	.91	.94	.98	1.01	1.04	1.08	1.12	1.15	1.19
17	.68	.70	.73	.75	.78	.80	.83	.86	.89	.92	.95	.98	1.02	1.05	1.09	1.12	1.16	1.20	1.23
17.5	.71	.74	.76	.79	.81	.84	.87	.90	.93	.96	.99	1.02	1.06	1.09	1.13	1.16	1.20	1.24	1.28
18	.75	.77	.80	.82	.85	.88	.91	.94	.97	1.00	1.03	1.06	1.10	1.13	1.17	1.21	1.24	1.28	1.32
18.5	.79	.81	.84	.86	.89	.92	.95	.98	1.01	1.04	1.07	1.11	1.14	1.18	1.21	1.25	1.29	1.33	1.37
19	.82	.85	.87	.90	.93	.96	.99	1.02	1.05	1.08	1.11	1.15	1.18	1.22	1.26	1.29	1.33	1.37	1.41
19.5	.86	.89	.91	.94	.97	1.00	1.03	1.06	1.09	1.12	1.16	1.19	1.23	1.26	1.30	1.34	1.38	1.42	1.46
20	.90	.93	.95	.98	1.01	1.04	1.07	1.10	1.13	1.17	1.20	1.24	1.27	1.31	1.35	1.39	1.43	1.47	1.51

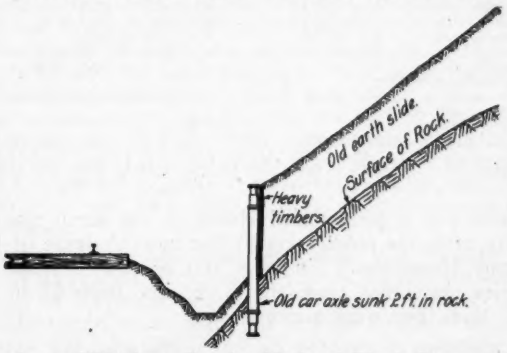
drained so that the earth will be firm there instead of soggy, because if it is soggy the great weight will continually force it downward and keep the mass in motion, and no matter how good the higher drainage is, there will be a movement as long as this base remains soggy.

Other slides are formed by masses of earth moving along a sloping surface of stone. As it takes comparatively little water to reduce the resistance of such a moving mass to a minimum, these slides often give a great amount of trouble. It has been found that the best cure for a slide of this nature is to bore holes down through the earth and into the solid stone for a depth of about a foot and break the smooth surface of the sloping stone by means of a light charge of high explosive, thereby giving the sliding earth a better hold.



Preventing a Slide by Breaking Up the Inclined Rock Surface

Bracing by pile driving at the toe often has a good effect and many slides that have given trouble for years have been stopped altogether by this method. An earth slide over a slope of stone that gave trouble for a long time was finally stopped by sinking two old car axles upright two feet into the stone slope and laying a few heavy timbers behind them. The earth behind these timbers has since become very compact and will probably never slide again.



Stopping a Slide by a Barrier Made of Plank Supported by Old Car Axles

The proper time to look after slides is just before winter sets in, for a stitch in time saves nine, and it is far easier to take nine stitches on a slide in good weather than it is to take one on a dark and rainy winter night. Every foreman should make it a point to go into this matter thoroughly before bad weather sets in and see that everything possible is being done to prevent them. No money can be spent more economically on a railroad.

What Is It Good For?—A resolution adopted by the Senate on March 8 calls on the Secretary of the Interior to advise what steps have been taken to develop the country traversed by the Alaskan Railway.

American Railway Engineering Association

The proceedings of the annual convention, which was held March 16-18, were presented in detail in the daily issues of the Railway Age. This convention was the most successful which has been held by that organization, the attendance of members and guests and the interest exceeding that of any previous year. The A. R. E. A., through its committee on personnel, has sent a letter to the members of various committees of that organization asking for suggestions regarding personnel for the ensuing year. This includes suggestions for chairman and vice-chairman. The entire subject of committee organization is now being given careful consideration by the Board of Direction in order that the increasing membership may be given representation and a part in the work of the association.

Bridge and Building Association

The executive committee of the American Railway Bridge and Building Association and interested members held a meeting in the Congress Hotel, Chicago, on March 17 to hear the report of the Arrangements Committee appointed to report on the annual convention which will be held in Atlanta, Ga., in October. It was found necessary to change either the location or date of the convention in order to secure suitable hotel facilities, and it was therefore decided to postpone the convention one week. It will therefore be held on October 26-28, inclusive.

The Roadmasters' Association

The executive committee of the Roadmasters' and Maintenance of Way Association met at the Auditorium Hotel on March 17 to consider plans for the annual convention, which will be held in September. After considerable discussion of the hotel facilities at St. Louis it was decided to adhere to the decision of the convention to hold the next meeting in that city.

The resignation of P. J. McAndrews as secretary was presented and after considerable discussion Mr. McAndrews consented to serve the remainder of his term and withdrew his resignation. A committee was also appointed to consider the possibility of employing a permanent secretary who will give his entire time to the work of the association.

Wood Preservers' Association

At an all-day meeting of the executive committee of the American Wood Preservers' Association, held in the Auditorium Hotel, Chicago, on March 18, committee assignments of interest to readers of the *Railway Maintenance Engineer* were made for the ensuing year as follows:

PRESERVATIVES. A. L. Kammerer, consulting timber engineer, St. Louis, chairman.

(A) Investigate the suitability of water gas tar and products of water gas tar for use in the preservative treatment of wood.

(B) Develop standard methods for handling zinc chloride at wood preserving plants, including the calculations involved.

(C) Determine the effect of various quantities of zinc chloride upon the strength of zinc treated wood.

TREATMENT.

(A) Recent developments in the treatment of fir ties, R. H. Rawson, consulting timber engineer, Portland, Ore., sub-chairman.

(B) Grouping of ties, C. E. Gosline, treating inspector, Delaware, Lackawanna & Western, Paterson, N. J., sub-chairman.

(C) Compile data regarding decay of wood in cars. C. C. Higgins, superintendent motive power, St. Louis-San Francisco, Springfield, Mo., sub-chairman.

(D) Develop standard specifications for the treatment of fir blocks. H. E. Horrocks, manager, Pacific Creosoting Company, Seattle, Wash., sub-chairman.

(E) Develop standard specifications for the treatment of poles. R. F. Hosford, telephone engineer, American Telephone & Telegraph Company, New York, sub-chairman.

1. Pressure treatments, C. C. Fritz, sub-chairman.
2. Non-pressure treatments, L. L. Hill, secretary, the Page & Hill Company, Minneapolis, Minn., sub-chairman.

(F) Develop standard practice in inspection of treatment, J. R. Keig, purchasing department, Atchison, Topeka & Santa Fe, Chicago, sub-chairman.

PLANT OPERATION. J. H. Waterman, superintendent timber preservation, Chicago, Burlington & Quincy, Galesburg, Ill., chairman.

(A) Develop standard practice in methods of peeling piles and poles. J. Montgomery, superintendent, Georgia Creosoting Company, Brunswick, Ga., sub-chairman.

(B) Develop suitable arrangements of equipment and methods and operation. D. W. Edwards, general superintendent, Greenlee Bros. & Co., Rockford, Ill., sub-chairman.

(C) Develop methods for loading closed cars. A. E. Larkin, manager, Republic Creosoting Co., Minneapolis, Minn., sub-chairman.

(D) Develop a suitable yard arrangement for seasoning switch ties. R. S. Belcher, superintendent, Somerville Treating Plant, Gulf, Colorado & Santa Fe, Somerville, Tex., sub-chairman.

UTILIZATION AND SERVICE. C. G. Crawford, vice-president, American Creosoting Company, Louisville, Ky., chairman.

(A) Define the conditions under which the various non-pressure treatments are justified. C. G. Crawford, sub-chairman.

(B) Bring service records up to date and make special study of tie renewal records on the Baltimore & Ohio, Cleveland, Cincinnati, Chicago & St. Louis, St. Louis-San Francisco and Chicago, Rock Island & Pacific. S. D. Cooper, chief inspector, Atchison, Topeka & Santa Fe, Topeka, Kan., sub-chairman.

THE MASTER PAINTERS OUTLINE PROGRAM

The executive committee of the Maintenance of Way Master Painters' Association held a meeting in Chicago on March 17 to discuss the program for the convention to be held in Detroit on October 5, 6 and 7. In addition to requesting papers on technical subjects of a number of paint technologists and manufacturers' chemists plans were made for reports to be presented by several committees of the association as follows: Economy in handling tools, fire retardant coatings, efficient coatings for iron and steel structures, boarding and camp cars, painted or frosted glass as a substitute for window shades and motor cars for roadway work.

MAINTENANCE OF WAY CONVENTIONS

American Railway Bridge and Building Association, C. A. Lichty, secretary, C. & N. W., Chicago. Next annual convention, Atlanta, Ga., October 26-28, 1920.

American Railway Engineering Association, E. H. Fritch, secretary, 431 South Dearborn street, Chicago. Next annual convention, Congress Hotel, Chicago, March 15-17, 1921.

American Wood Preservers' Association, F. J. Angier, secretary, Mount Royal Station, Baltimore, Md. Next annual convention, San Francisco, Cal., January 25-27, 1921.

Maintenance of Way Master Painters' Association of the United States and Canada, E. E. Martin, secretary, Room 19, Union Pacific Building, Kansas City, Mo. Next annual convention, Detroit, Mich. October 5-7, 1920.

Roadmasters' and Maintenance of Way Association of America, P. J. McAndrews, secretary, C. & N. W., Sterling, Ill. Next annual convention, St. Louis, Mo., September 21-23 1920.

THE MATERIAL MARKET

WITH THE STEEL market rising nearly all along the line from month to month, it is difficult to select any particular classes of material in which the advances have been most notable. Considering the month just passed, structural steel seems to have shown the greatest rise, for while the nominal prices remain as they were established last year, the quotations at which a reasonable delivery is assured are considerably higher than those given last month. The reason for the prominence of structural steel in this connection at the present time is no secret. The awards of structural steel contracts have been heavy for several months, and the tonnages on the books of the shops at the present time, according to the Bridge Builders' and Structural Society, are higher than they have been since the middle of 1918. Inquiries for new steel cars, no doubt, have also influenced the demand for plain material. Under these circumstances, the cost of fabricated steel bridges is exceedingly high. Tonnage prices recorded recently were $95 for plate girders, $115 for truss spans and in the neighborhood of $150 for turntables complete with bearings.

The status of the rail prices remains as it was last month, with some of the mills demanding $55 and $57 for Bessemer and open-hearth rail, respectively, and even higher prices for small orders, although the U. S. Steel Corporation still quotes $45 and $47. There is some activity in the rail market and at least one order has been placed for 1921 delivery. The market for track fastenings is also active. Recent orders for track spikes include 10,000 kegs for the Pennsylvania Railroad, 6,000 kegs for the New York Central and 10,000 kegs for the Northern Pacific. The Chicago, St. Paul, Minneapolis & Omaha is also reported to have purchased 1,500 tons of tie plates.

	Prices in Cents Per Pound			
	February 15		March 20	
	Pittsburgh	Chicago	Pittsburgh	Chicago
Track spikes	3.60	3.62 to 3.87	4.00	3.62 to 3.87
Track bolts	....	5.17 to 5.27	6.00	5.17 to 5.27
Boat spikes	4.25	4.52	4.25	4.52
Angle bars	2.75	2.75	2.75	2.75
Tie plates, steel	2.75	2.75	2.75	2.75
Tie plates, iron	3.00 to 4.00	3.75	3.00 to 4.00	3.75
Plain wire	3.00 to 3.50	....	3.00 to 3.50	3.27 to 3.77
Wire nails	3.25 to 4.50	....	3.25 to 4.00	3.52 to 4.27
Barbed wire, galvanized	4.10 to 4.45	....	4.10 to 4.45	4.37 to 4.72
C. I. pipe, 6-in. or larger (per ton)	....	69.80	....	72.80
Plates	2.65 to 2.90	2.92 to 3.17	2.65 to 4.00	2.92 to 4.27
Shapes	2.45 to 2.70	2.72 to 3.77	2.45 to 4.00	2.72 to 4.27
Bars (steel)	2.35 to 3.00	2.62 to 3.52	2.35 to 4.00	2.62 to 4.52
Rivets	4.50	4.42	4.50	4.77

There was a pronounced slump in the scrap market shortly after the publication of last month's issue of the *Railway Maintenance Engineer* and in spite of some recoveries since that time, the prices are from $1 to $2 lower than they were a month ago.

	Per Gross Ton	
	Chicago	St. Louis
Relaying rails	$40.00 to $50.00	$45.00 to $50.00
Rerolling rails	32.00 to 33.00	32.50 to 33.00
Rails less than 3 ft. long	28.00 to 28.50	28.00 to 28.50
Frogs and switches, cut apart	23.50 to 24.00	26.00 to 26.50
	Per Net Ton	
No. 1 railroad wrought	26.00 to 26.50	25.50 to 26.00
Steel angle bars	24.00 to 24.50	23.00 to 23.50

There has been a marked reduction in the demand for lumber because of the very high prices and also because of the high cost of building as affected by the prices of both material and labor. As a consequence there has been some weakening of the prices and some uneasiness on the part of the dealers, who are proposing various plans for so-called "stabilization" of prices, price guarantees, etc. While recognizing the present uncertainty, the lumber dealers are inclined to consider it a temporary condition rather than an indication that the price peak has been reached.

GENERAL NEWS DEPARTMENT

Anatole Mallet, the inventor of the compound locomotive which bears his name, died in Nice, France, in October, 1919.

The Atchison, Topeka & Santa Fe has discontinued the operation of the Port Bolivar & Iron Ore Railroad, extending from Long View, Tex., to Iron City, a distance of about 30 miles.

At the annual meeting of the town of Wellesley, Mass., the Board of Selectmen unanimously adopted a resolution thanking the Boston & Albany for its good service during the adverse weather conditions of the past winter.

The Southern Pacific has been notified by the Western Pacific that the arrangement made by the United States Railroad Administration under which the two roads used the Western Pacific tracks between Wells, Nev., and Winnemucca, a distance of 200 miles, is now void, and that the practice must be discontinued.

The Railroad Association of Canada has announced an embargo on the sending of Canadian freight cars into the United States. Because of the shortage of cars in the United States it is said that American railroads are not returning a sufficient number of Canadian cars, and the embargo is considered necessary in order to relieve the lumber famine in Canada.

Radio telegraph apparatus has been installed by the Louisville & Nashville in its general office at Louisville, Ky., with which the road intends to provide facilities for radio communication with its division headquarters. One of the objects considered in establishing this service is quick communication with the United States Weather Service so as to obtain forecasts of Gulf storms.

The Interstate Commerce Commission's monthly summary of railroad returns for January, covering 189 Class I roads and 15 switching and terminal companies, shows gross receipts of $500,860,649; railway operating expenses of $414,788,982; net revenue from railway operations $86,071,667; net operating income of $68,401,109, and maintenance of way and structure expenses of $57,903,492.

On March 16 employees of the Louisville & Nashville filed articles for the incorporation of the Railroad Employees Co-operative Association, putting into effect a plan voted on at a mass meeting held during the week of March 8 to curtail the cost of living. The capital stock is $10,000, divided into $10 shares. It is the purpose of the association to offer all the necessities of life for sale to the stockholders at cost price with a small margin for overhead expenses.

"Labor," the Plumb plan newspaper, said recently that one of its readers employed on a Southern railroad sent in a copy of a circular issued by the general manager to all stationmasters, agents and other officials in charge of buildings, in which he directs that all windows in passenger stations be cleaned by March 1, 1920. "Of course," the paper says, "the cleaning will be done at government expense, and will effect just that much of a saving for the owners of the road."

The annual convention of the National Association of Railroad Tie Producers which was originally scheduled to be held in Chicago on February 12 and 13, and which was postponed at that time because of the influenza epidemic, will be held at the Hotel Sherman, Chicago, Thursday and Friday, April 22 and 23. An effort will be made to secure a large attendance of representative producers of railroad cross-ties to discuss the problems affecting that industry incident to the return of the railways to private control.

The Canadian Government now owns or directly controls 22,000 miles of railway, this total being reached a month ago when the Grand Trunk voted to accept the offer of the Canadian Government to take that property over, thereby adding 3,579 miles of line to the lines previously under government control. These include the Intercolonial and the Prince Edward Island, which were originally built and owned by the government, and the Canadian Northern, the Grand Trunk Pacific and the Grand Trunk Pacific branch lines, which were built by private companies and later taken over by the government.

The United States Board of Surveys and Maps, created on December 30, 1919, by an executive order of the President, has perfected a permanent organization and held its first public meeting on March 9. The object of this board, as outlined in the President's order, is to co-ordinate the activities of the various map-making agencies of the executive departments of the government and avoid the unnecessary duplication of work which may come about very readily when maps and surveys are being made by independent branches of the government. Under the by-laws of this board, which were adopted on January 16, the board will hold meetings on the second Tuesday of January, March, May, September and November of each year and solicits representation by various interested activities at these meetings.

Construction work on the southern and northern divisions of the Alaska Railroad will begin in April, when between 1000 and 2000 men will be employed by the Alaskan Engineering Commission at Anchorage, Alaska, and sent north. It is expected that the laying of rails along the route of the line will be completed by the fall of 1921, while all track will be ballasted and in condition for operation by the fall of 1922. At the present time there is a gap of about 100 miles between the end of steel in the southern or Seward division and the end of steel in the northern or Fairbanks division. A bridge with a span of 504 ft. will be built across the Susitna river and will cost approximately $500,000. Bids have been received and the work is expected to begin in April. The work is under the direction of William Gerig, assistant chief engineer.

Only 29 railroads earned their guaranteed return during the calendar year of 1919, while 134 roads earned less than the guarantee. According to condensed income accounts compiled by the operating statistic section of the Railroad Administration only 57 per cent of the standard return was earned by the Class I roads in 1919 as compared with 76.8 per cent in 1918. The largest earnings in proportion to the standard return were those obtained by the Fort Worth & Rio Grande, amounting to 1576.8 per cent of the guarantee. The Michigan Central obtained the best record for any of the larger roads with earnings of 210.7 per ecnt of the guarantee. On the other hand the Erie, with a standard return of $15,729,068 earned only 6.6 per cent of that amount in 1919 and had an actual deficit in 1918. Other roads having small earnings include the Baltimore & Ohio with 18 per cent, the Pennsylvania Lines East with 15.6 per cent and the Chicago, Milwaukee & St. Paul with 11.6 per cent.

The New York Central won its suit in the New York State Court of Appeals to annul the New York law forbidding the construction of a bridge of two spans across the Hudson river at Castleton, N. Y., nine miles south of Albany. The court held that the federal government has authority concerning the use of lands under water superior to the authority of the state when it handed down its decision on March 2. The city of Albany, which had been back of the restrictive legislation, claimed that the construction of a freight line around the city was inimical to its interest and also that a pier in the river would be an unreasonable obstacle to navigation. However, the secretary of war rejected this plea and it was shown that a single span would require 18,000 tons of steel more than a bridge of two spans, as the design prepared by the railroad provides for a span over the main channel 600 ft. long, which allows for a channel wider than that in many parts of the river below the bridge, while a single span would have to be 1,000 ft. long.

PERSONAL MENTION

GENERAL

Matt Lucy, assistant engineer on the Missouri Pacific, with headquarters at St. Louis, Mo., has been appointed industrial commissioner, with the same headquarters.

J. R. Leighty, corporate chief engineer of the Missouri Pacific, with headquarters at St. Louis, Mo., has been appointed assistant to the vice-president, with the same headquarters.

O. M. Barlow, roadmaster of the Hazen district of the Salt Lake division of the Southern Pacific, has also been appointed trainmaster, with jurisdiction westward to Fernley and from Hazen to Fallon, with headquarters at Susanville, Cal.

A. T. Hardin, who served as director of the Eastern region since June, 1919, and previous to that as engineering assistant to the regional director, has been elected vice-president in charge of operation of the New York Central, the position he held previous to his connection with the office of the Eastern region.

R. G. Kenly, general superintendent of the Minneapolis & St. Louis during federal control and prior to that time general manager, with headquarters at Minneapolis, Minn., has been appointed assistant to the president and chief engineer, with the same headquarters. Mr. Kenly was chief engineer of this road prior to his promotion to general manager in March, 1917.

J. L. Haugh, engineering assistant to the regional director of the Northwestern region, with headquarters at Chicago, has been appointed assistant to the president of the Union Pacific, with headquarters at Omaha, Nebr. Mr. Haugh, who was born in 1887, took a two-year course in special engineering work at the University of Michigan and one year at the University of Wisconsin. He entered railway service with the Chicago & North Western in 1905 as a draftsman on maintenance work. In 1906 he was employed by the Manitowoc, Green Bay & North Western on construction work and for the next two years was successively topographer on railway location and instrumentman on maintenance for the North Western. Later he became locating engineer on the Milwaukee, Sparta & North Western, and the following two years was assistant to the engineer in charge of the construction of the St. Louis, Peoria & North Western from Peoria, Ill., to Girard. He was engineer on heavy grade reduction between Manlius, Ill., and Radnor on the Chicago & North Western for six months, following which period he served as assistant engineer on valuation work for two and one-half years, later being promoted to assistant to the chief engineer. One year later he was appointed engineer of capital expenditures in the office of the Northwestern regional director and in January, 1919, was appointed engineering assistant to the Northwestern regional director, which position he held until his appointment as noted above.

J. L. Haugh

C. E. Lindsay, member of the Board of Wages and Working Conditions, United States Railroad Administration, and formerly division engineer of the New York Central at Albany, N. Y., has been appointed by the railroads as one of their representatives in the conference which has undertaken to obtain a settlement in the controversy between the roads and the brotherhoods on wage matters.

A. S. Baldwin, corporate vice-president of the Illinois Central during the period of government control, with headquarters at Chicago, has been elected vice-president in charge of Chicago terminal improvements. Mr. Baldwin was chief engineer of the Illinois Central previous to federal control.

George Hand, corporate chief engineer of the Chicago & North Western, with headquarters at Chicago, has been promoted to the position of assistant to the president, with the same headquarters. Mr. Hand was born at Huntertown, Ind., in 1882, and received his education at Purdue University. He entered railway service with the Chicago & North Western in March, 1903, as a tapeman, and served successively as rodman and instrumentman on location, construction and surveys. In 1907 Mr. Hand was appointed assistant engineer on track elevation work, later being transferred to the chief engineer's office and assigned to special duties. He was assigned exclusively to valuation work when the valuation law was passed and was subsequently appointed valuation engineer and a member of the valuation committee of the Chicago & North Western and valuation engineer of the Chicago, St. Paul, Minneapolis & Omaha. On November 1, 1918, Mr. Hand was appointed corporate engineer of both companies, which position he held at the time of his appointment as mentioned above.

George Hand

R. B. Abbott, division superintendent of the Philadelphia & Reading, with headquarters at Philadelphia, Pa., who was formerly in the engineering department, has been promoted to assistant general superintendent at Reading, Pa. Mr. Abbott was born at Philadelphia, Pa., on July 14, 1881. He entered railway service with the Philadelphia & Reading on October 1, 1900, and in December of the same year was appointed assistant supervisor at Tamaqua. In 1905 he was transferred to Reading and two months later to Harrisburg. On June 6, 1905, he was promoted to supervisor at Allentown, Pa., later serving in the same capacity at Olney, Philadelphia and Pottsville, Pa. He was promoted to division engineer at Harrisburg, Pa., in March, 1910, in which capacity he served until March, 1916, when he was promoted to superintendent of the Shamokin division, later in the same month being transferred to the Harrisburg division, with headquarters at Harrisburg. In August, 1918, Mr. Abbott was appointed superintendent of the New York division, which position he held at the time of the promotion noted above.

E. M. Durham, Jr., chief engineer of construction of the Southern Railway System, at Washington, D. C., has been appointed manager of the Department of Way and Structures, Division of Liquidation Claims, with headquarters at Washington. Mr. Durham was born at Memphis, Tenn., on October 23, 1875, and received his education at Lehigh University. He entered railway service with the Chicago & Northwestern in 1899, and later served on the Southern as assistant engineer at Selma, Ala. He was appointed assistant engineer at Birmingham, Ala., in 1901, and in 1905 became principal assistant engineer at Birmingham. In 1914 he went to the Atlanta, Birmingham & Atlantic as special valuation engineer, with office at Atlanta, Ga., and in 1916 he returned to the service of the Southern as general agent at Chattanooga, Tenn. From 1917 until August, 1918, Mr. Durham served as assistant chief engineer of con-

struction, with office at Washington, being promoted to chief engineer of construction on the latter date, which position he held at the time of his appointment as noted above.

Robert E. Woodruff, general superintendent of the Erie, Lines West, with headquarters at Youngstown, Ohio, who was appointed manager of the Hornell region of the same road, with headquarters at Hornell, N. Y., as noted in last month's issue, is an engineer. Mr. Woodruff was born in Green Bay, Wis., and graduated from Purdue University in 1905. He entered railway service as a section laborer on the Erie, and subsequently became track foreman, inspector of construction and assistant division engineer. From November, 1906, until December, 1908, he served in the capacity of division engineer at Meadville, Pa. He was appointed trainmaster at Galion, Ohio, in December, 1908, which position he retained until March, 1909, when he became general agent of the Chicago Terminal division. From December, 1910, until May 15, 1912, Mr. Woodruff was superintendent, with headquarters at Rochester, N. Y., and on the latter date was transferred to Marion, Ohio. In November, 1916, he was transferred to Youngstown and on November 1, 1917, he was promoted to superintendent of transportation, with the same headquarters. On June 15, 1918, he was promoted to general superintendent, which position he held at the time of his appointment as noted above.

J. O. Hackenberg, principal assistant engineer of the Southern division of the Pennsylvania Railroad, with headquarters at Wilmington, Del., has been promoted to superintendent of the Schuylkill division, with headquarters at Reading, Pa. Mr. Hackenberg was born in Milton, Pa., on February 25, 1878, and graduated from Bucknell University. He entered railway service with the Pennsylvania on May 21, 1900, as a rodman on the Cambria and Clearfield division, at Cresson, Pa. He was later transferred to the chief engineer's department as a levelman and was engaged on the South Side track elevation on the Monongahela division. On May 15, 1902, he was promoted to transitman in the office of the principal assistant engineer at Altoona, Pa. Mr. Hackenberg was promoted to assistant supervisor at Millersburg, Pa., on March 1, 1903, and on January 15, 1904, was transferred to the main line as assistant supervisor on the Middle division. He was promoted to supervisor on the Allegheny division on September 1, 1905; was transferred to the Baltimore division on December 1, 1908, and returned to the main line on June 16, 1913, as supervisor on the Pittsburgh division at East Liberty, Pa. From April until October, 1917, he served as division engineer of the Allegheny division, with office at Oil City, Pa. In October he was transferred to the Maryland division, and on October 20, 1919, was promoted to principal assistant engineer of the Southern division, which position he held at the time of his recent promotion.

J. O. Hackenberg

George M. Huss, assistant engineer of the Division of Capital Expenditures of the Railroad Administration, has been appointed chairman of the Committee on Claims, organized by the Division of Liquidation Claims, which is to have charge of the investigation of all claims under the section of the contracts between the Railroad Administration and the carriers relating to upkeep and capital expenditures. Mr. Huss has acted as assistant engineer of the Division of Capital Expenditures since July 1, 1918, in charge of the physical progress of construction work during federal control. He was born at Tiffin, Ohio, in 1859, and received his education at Cornell University. He entered railway service on the Wabash in 1880. He has had charge of the construction of many important lines in this country, including portions of the Atchison, Topeka & Santa Fe, the Chicago & Eastern Illinois, the Chicago & Grand Trunk, the Northern Pacific, and the Wisconsin Central. From 1890 to 1893 he was chief engineer in charge of construction of the original line of the Deming, Sierra Madre & Pacific, now occupied partly by the Mexican Northwestern, and partly by the Kansas City, Mexico & Orient. From 1894 to 1896 he was chief engineer and builder of the Syria Ottoman Railway from Haifa on the Mediterranean coast to Damascus. From 1908 to 1918 Mr. Huss was construction engineer of the Minneapolis, St. Paul & Sault Ste Marie, locating over 1,200 miles for that company, and building 600 miles.

R. H. Aishton, who was for two years regional director first of the Western and later the Northwestern regions of the United States Railroad Administration at Chicago, and more recently also president of the American Railroad Association, has been retained as the president of that organization with its return to the control of the corporate managements. Mr. Aishton is a graduate of the maintenance of way department, having served for 17 years in various positions from axman to division engineer. He was born at Evanston, Ill., on June 2, 1860, and entered railway service in 1878 with the Chicago & North Western as an axman in the engineering corps. He served consecutively on this road as rodman, levelman, assistant engineer, superintendent of bridges and buildings and division engineer until June 1, 1895, at which time he was appointed assistant superintendent. From April 1, 1897, to November 1, 1899, he served in the capacity of division superintendent, at the latter date being promoted to general superintendent. He remained in this position until July 1, 1902, when he became assistant general manager, which position he retained until January 24, 1906, when he was promoted to general manager. On November 1, 1910, Mr. Aishton was elected vice-president in charge of operation and maintenance and in May, 1916, he was elected president and a director of the road. In January, 1918, he was selected by Director-General McAdoo as regional director of the Western region of the United States Railroad Administration, with headquarters at Chicago. In June, 1918, when the Western region was divided into three, he was appointed regional director of the Northwestern region, which position he retained until the end of federal control.

R. H. Aishton

B. Herman, chief engineer maintenance of way and structures of the Southern, with headquarters at Charlotte, N. C., has been promoted to assistant to the vice-president, with headquarters at Washington, D. C. Mr. Herman was born at Washington, D. C., on February 5, 1876, and received his education at the Massachusetts Institute of Technology. He entered railway service as a draftsman on the Baltimore & Ohio on July 1, 1900, and was appointed assistant engineer in the bridge and building department of the Southern on October 1, 1900. From February, 1904, until November, 1906, he served as chief bridge inspector, and from the latter date until June, 1909, as engineer of bridges. In June, 1909, he was appointed engineer of bridges of the Cincinnati, New Orleans & Texas Pacific, which position he held until November, 1910, when he was promoted to principal assistant engineer on the Southern. In August, 1911,

he was promoted to chief engineer maintenance of way and structures and on January 17, 1917, was appointed chief engineer maintenance of way and structures, Lines East, with headquarters at Charlotte, N. C., which position he held until his appointment as noted above.

William L. Derr, superintendent of the Chicago Great Western, with headquarters at Clarion, Iowa, who has recently been appointed land tax commissioner of that road, with headquarters at Chicago, obtained a large part of his railway experience in the engineering department. He was chief engineer of the Erie from May, 1903, to March, 1905. In June, 1912, Mr. Derr was appointed superintendent of the Western division of the Chicago Great Western, which position he held until his recent appointment.

ENGINEERING

E. S. Pennebaker has been appointed corporate engineer of the Texas & Pacific, with headquarters at Dallas, Tex.

J. H. Milburn, chief draftsman on the Baltimore & Ohio at Baltimore, Md., has been appointed office engineer with office at the same place.

B. H. Bryson, first engineer of the Fort Dodge, Des Moines & Southern, with headquarters at Fraser, Iowa, has been made chief engineer.

D. B. Thompson, special assistant contracting engineer of the New York Central, has been appointed assistant district engineer of the Eastern district.

L. Andrews has been appointed chief engineer of the San Antonio & Aransas Pass, with headquarters at San Antonio, Tex., succeeding **I. A. Cottingham.**

Robert H. Ford, principal assistant engineer of the Chicago, Rock Island & Pacific, with headquarters at Chicago, has been promoted to assistant chief engineer.

I. W. Troxel, corporate chief engineer of the Chicago, Milwaukee & Gary, with headquarters at Rockford, Ill., has been reappointed chief engineer of that road.

L. D. Blauvelt, who was formerly chief engineer of the Denver & Salt Lake, has been appointed consulting engineer of this road, with headquarters at Denver, Colo.

A. H. Griffith, engineer of construction of the Baltimore & Ohio, Western Lines, with office at Cincinnati, Ohio, has been appointed district engineer with the same headquarters.

C. M. Nye, principal assistant engineer of the Great Northern, with headquarters at St. Paul, Minn., has been appointed assistant chief engineer, with the same headquarters.

W. W. K. Sparrow, corporate chief engineer of the Chicago, Milwaukee & St. Paul, has been appointed assistant chief engineer in charge of valuation, with headquarters at Chicago.

Samuel T. Wagner, corporate chief engineer of the Philadelphia & Reading, with headquarters at Philadelphia, Pa., has been reappointed chief engineer, with the same headquarters.

J. E. Barrett, superintendent track, bridges and buildings of the Lehigh & Hudson River, with headquarters at Warwick, N. Y., has been appointed engineer of maintenance, with the same headquarters.

A. R. Raymer, assistant chief engineer of the Pittsburgh & Lake Erie, with headquarters at Pittsburgh, Pa., has been promoted to chief engineer, with the same headquarters, succeeding **J. A. Atwood,** deceased, as noted elsewhere.

E. H. Shipman, corporate engineer of the Lehigh & New England, has been reappointed chief engineer of that road, with headquarters at Bethlehem, Pa., this being the position he held previous to government control.

W. Claus, assistant division engineer of the Cumberland & Pennsylvania, with headquarters at Cumberland, Md., has been reappointed engineer maintenance of way, with the same headquarters, this being the position he held prior to federal control.

L. G. Curtis, corporate chief engineer of the Baltimore & Ohio, with headquarters at Baltimore, Md., has been appointed chief engineer, adjusting division, of that road, and also assistant chief engineer of the Baltimore & Ohio Chicago Terminal, with the same headquarters.

A. H. Porter, district engineer of the Charleston & Western Carolina, with headquarters at Augusta, Ga., has been appointed engineer of roadway, with the same headquarters, this being the position he held prior to government control.

E. C. Conners, of the construction department of the Alaskan Engineering Commission, has been appointed assistant superintendent of construction in the telegraph and telephone department, with headquarters at Anchorage, Alaska.

Arthur Maguire, engineer maintenance of way of the Los Angeles & Salt Lake, with headquarters at Los Angeles, Cal., has been appointed chief engineer, with the same headquarters, this being the position he held prior to federal control.

H. F. Passel, engineer maintenance of way of the Cincinnati, Indianapolis & Western, with headquarters at Indianapolis, Ind., has been reappointed chief engineer, with the same headquarters. This was the position he held prior to government control.

Samuel Murray, chief engineer of the Oregon-Washington Railroad & Navigation Company, with headquarters at Portland, Ore., has had his title changed to assistant chief engineer, the position of chief engineer of the Oregon-Washington Railroad & Navigation Company having been abolished.

T. J. Wyche, corporate engineer of the Western Pacific, with headquarters at San Francisco, Cal., has been reappointed chief engineer, with the same headquarters, succeeding **J. H. Knowles,** who has resigned to engage in private practice. Mr. Wyche held this position prior to government control.

E. W. Hammond, acting engineer maintenance of way of the Buffalo, Rochester & Pittsburgh, with headquarters at Rochester, N. Y., has been appointed engineer maintenance of way with the same headquarters. **J. B. Oatman,** acting division engineer at Du Bois, Pa., has been appointed division engineer with the same headquarters.

R. J. Gammie has been appointed assistant engineer on the Texas & Pacific, with headquarters at Fort Worth, Tex., succeeding **E. H. McIlhern. H. G. Lytle** has been appointed assistant engineer, with headquarters at Dallas, Tex., succeeding **F. R. Naylor. H. E. Birkinsha** has been appointed assistant engineer, with headquarters at Eastland, Tex.

William Hood, corporate chief engineer of the Southern Pacific, with headquarters at San Francisco, Cal., has been reappointed chief engineer, with headquarters at Los Angeles, Cal., succeeding **W. H. Kirkbride,** who has been appointed engineer of maintenance of way and structures, with headquarters at San Francisco, in place of **W. M. Jaekle.** Mr. Jaekle has been appointed assistant engineer maintenance of way and structures.

A. M. Burt, assistant director in charge of maintenance of the Division of Operation of the United States Railroad Administration and chairman of the Automatic Train Council Committee, and, previous to federal control, general manager of the Northern Pacific, has been appointed assistant to the vice-president in charge of operation of the same road. A sketch of Mr. Burt's railway career appeared in the July, 1919, issue of the *Railway Maintenance Engineer.*

H. Fernstrom, corporate chief engineer of the Virginian, with headquarters at Norfolk, Va., has been appointed chief engineer, with the same headquarters, the position he held prior to government control. **A. M. Traugott,** who has been acting chief engineer, has been appointed assistant chief engineer. Mr. Traugott was division engineer previous to his appointment as acting chief engineer in June, 1919.

William H. Hoyt, assistant chief engineer of the Duluth, Missabe & Northern, with headquarters at Duluth, Minn., has been promoted to chief engineer with the same headquarters. Mr. Hoyt was born at Owatonna, Minn., on October 13, 1867, and graduated from the University of Minnesota in 1890. He entered railway service the following

year as an assistant engineer on the Duluth, Missabe & Northern, which position he held until 1901, when he was appointed principal assistant city engineer of Duluth, Minn. Two years later he returned to the Duluth, Missabe & Northern as an assistant engineer, being promoted in 1905 to assistant chief engineer, which position he retained until his further promotion as noted above.

W. H. Hess, who was chief engineer of the Colorado & Southern during the period of government control, has been appointed valuation engineer, with headquarters at Denver, Colo., as a consequence of the return of **R. C. Gowdy** to the position of chief engineer, Mr. Gowdy having been corporate chief engineer during the period of government control, with headquarters at Denver, Colo.

O. T. Nelson, engineer maintenance of way of the Atlanta & West Point, the Western Railway of Alabama and the Georgia Railroad, with headquarters at Atlanta, Ga., has been made chief engineer, succeeding **L. L. Beall. S. R. Young,** district engineer, with headquarters at Atlanta, has been promoted to assistant chief engineer, with the same headquarters. **H. W. Seib,** division engineer, with headquarters at Atlanta, has been made consulting engineer, with the same headquarters.

E. A. Hadley, engineering assistant to the regional director of the Southwestern region, with headquarters at St. Louis, Mo., has been reappointed chief engineer of the Missouri Pacific, with headquarters at St. Louis, Mo. **H. R. Carpenter,** chief engineer, has been reappointed assistant chief engineer, with headquarters at St. Louis, Mo., as a consequence of the reappointment of Mr. Hadley, and **R. C. White,** assistant chief engineer, has been made assistant chief engineer in charge of maintenance.

W. L. Breckinridge, who was chief engineer of the Chicago, Burlington & Quincy during the period of government control, has been appointed assistant chief engineer, system, in consequence of the return of **A. W. Newton** to the position of chief engineer, Mr. Newton having been corporate chief engineer during government control. Mr. Breckinridge was engineer maintenance of way of the Lines East previous to federal control. **C. L. Persons** and **F. T. Darrow** continue as assistant chief engineers of the Lines East and Lines West, respectively.

G. P. Stowitts, district engineer, Eastern District, New York Central & Hudson River, has resigned to become chief engineer of the Lord Dry Dock Company, with headquarters at West New York, N. J. Mr. Stowitts graduated from Rensselaer Polytechnic Institute in 1900 and served in the engineering department of the New York Central continuously since that time as draftsman, assistant supervisor on track and assistant engineer, in the office of engineer maintenance of way. In 1909 he became assistant designing engineer and later chief draftsman in charge of general designing. He was later promoted to district engineer of the Eastern district.

E. L. Martin, who served as chief engineer of the Missouri, Kansas & Texas during the period of government control, with headquarters at Dallas, Tex., has been appointed assistant chief engineer, with the same headquarters, as a consequence of the reappointment of **F. Ringer** as chief engineer, with headquarters at St. Louis, Mo., Mr. Ringer having served as corporate chief engineer during the period of government control. The same changes of title for Mr. Ringer and Mr. Martin apply to their positions on the Missouri, Kansas & Texas of Texas, except that Mr. Ringer will have an office at Dallas, Tex., insofar as supervision of the Texas lines is concerned.

Henry J. Sargent, corporate engineer of the Boston & Maine during federal control, with office at Boston, Mass., has been appointed assistant chief engineer of this road in charge of valuation and real estate engineering. **William F. Cummings** has been appointed assistant valuation engineer, **John B. Russell,** real estate engineer, and **Frank B. Rowell,** research engineer, all reporting to Mr. Sargent. **Pusey Jones** has been appointed bridge engineer and **Henry B. Fletcher,** architect, both reporting to the engineer of structures. For construction work the road will be divided into two districts, eastern and western. **George L. Huckins,** construction engineer for the system, becomes construction engineer, eastern district, and **Charles J. Griffin** becomes construction engineer, western district. Under the new organization **Russel J. Hammond,** designing engineer, becomes office engineer and will supervise the preparation of project plans, maintenance of way standards, maximum weight and clearance charts, expenditure authorities and the progress and completion reports covering the same.

G. A. Noren, assistant engineer on the New York Central & Hudson River, has been promoted to the position of engineer of grade crossings, succeeding **B. S. Voorhees,** transferred. Mr. Noren received his education at the University of Pennsylvania and entered railway service with the Pennsylvania Railroad in 1910. He was appointed assistant engineer for the Electric Railway, Light & Power Company, Monterey, Mexico, soon afterwards. He also engaged in private practice in Monterey for a short time, after which he returned to this country to enter the engineering department of the New York Central, where he has served continuously since that time.

H. O. Kelley, whose promotion to division engineer on the Wabash, with headquarters at St. Louis, Mo., was noted in the March issue, was born at Lebanon, Ind., on July 17, 1890. He received his education at the Rose Polytechnic Institute and entered railway service in August, 1913, with the engineering corps of the Chicago & Eastern Illinois. In March, 1916, he was appointed engineer maintenance of way of the Evansville & Indianapolis, with headquarters at Terre Haute, Ind., in which capacity he served until June, 1918, when he was appointed assistant engineer in the office of the chief engineer maintenance of way of the Wabash, remaining in this position until his appointment as noted above.

E. M. Moursund, division engineer of the Missouri, Kansas & Texas, with headquarters at Muskogee, Okla, has been promoted to engineer maintenance of way of the Missouri, Kansas & Texas Railway of Texas, with headquarters at Dallas, Tex., succeeding **A. E. Triplett.** Mr. Moursund received his education at the A. & M. College of Texas, graduating in 1897. From 1900 to 1915, he was employed by the Southern Pacific successively as roadmaster's clerk, rodman, track foreman, instrumentman, assistant engineer, division engineer and assistant superintendent. He entered the employ of the International & Great Northern in 1915 as assistant engineer, later being promoted to assistant superintendent in charge of maintenance of way. Mr. Moursund was appointed division engineer on the Missouri, Kansas & Texas in March, 1917, which position he retained until his promotion as noted above.

B. S. Voorhees, engineer of grade crossings of the New York Central, Eastern Lines, has been appointed district engineer of the Eastern district, succeeding **G. P. Stowitts,** resigned, as noted elsewhere. Mr. Voorhees graduated from Yale University in 1907 and began railway service with the New York, New Haven & Hartford. Later he entered the employ of the New York Central in the maintenance of way department at Albany, being promoted soon afterward to inspector in the engineering department at Watertown, N. Y. Three years later he returned to Albany as assistant engineer, where he remained only a few months before coming to the office of the engineer of grade crossings in New York, where he served as assistant engineer. In April, 1916, he was promoted to engineer of grade crossings, which position he retained until his recent appointment.

D. E. Gelwix, district engineer on the St. Louis-San Francisco, with headquarters at Springfield, Mo., has been appointed division engineer, Eastern division, with the same headquarters. **R. Owen,** assistant engineer, with headquarters at Springfield, Mo., has been appointed acting division engineer, Southwest division, with headquarters at Sapulpa, Okla. **E. T. Bond,** assistant district engineer, with headquarters at Springfield, Mo., has been appointed division engineer, Western division, with headquarters at Enid, Okla. **H. F. Busch,** assistant district engineer, with headquarters at Springfield, Mo., has been appointed di-

vision engineer, Northern division, with headquarters at Ft. Scott, Kans. **J. G. Taylor** has been appointed division engineer, Southern division, with headquarters at Memphis, Tenn. **L. L. Kerns**, assistant district engineer, with headquarters at Memphis, Tenn., has been appointed division engineer, River and Cape division, with headquarters at Chaffee, Mo. **Perry Topping**, assistant engineer, with headquarters at St. Louis, Mo., has been promoted to division engineer, Central division, with headquarters at Ft. Smith, Ark. **F. P. Swartz**, district engineer, with headquarters at Springfield, Mo., has been transferred to Ft. Worth, Tex. **T. E. Bliss**, assistant district engineer at Ft. Worth, Tex., has been appointed division engineer with the same headquarters.

H. R. Artman, assistant engineer on the Seaboard Air Line at Atlanta, Ga., **L. A. Murr**, assistant engineer at Portsmouth, Va., and **H. B. Cartwright**, assistant engineer at Jacksonville, Fla., have all been given the title of district engineer, with headquarters as before. **E. W. Smith**, assistant engineer at Norfolk, Va., has been appointed assistant to the chief engineer.

G. J. Ray, engineering assistant to the regional director of the Eastern region, with headquarters at New York City, has been reappointed chief engineer of the Delaware, Lackawanna & Western, with headquarters at Hoboken, N. J. **L. L. Tallyn**, acting chief engineer, has been reappointed division engineer at Scranton, Pa., succeeding **A. F. Colligan**, acting division engineer.

H. E. Barlow, assistant engineer on the Chicago, St. Paul, Minneapolis & Omaha, with headquarters at St. Paul, Minn., has been promoted to chief engineer, with the same headquarters, succeeding **H. Rettinghouse**, resigned. **H. P. Padley**, principal assistant engineer, with headquarters at St. Paul, has been promoted to assistant chief engineer. Mr. Barlow was born at Baraboo, Wis., on March 25, 1880, and graduated from the University of Minnesota in 1903, but gained considerable railway experience before and during his college training. He entered railway service in June, 1896, with the Chicago, St. Paul, Minneapolis & Omaha as an office boy in the general freight department. From 1899 to 1900 he was a chainman, being promoted to rodman and later becoming instrument man. He was promoted to assistant engineer in June, 1902, which position he retained until his recent promotion to the position of chief engineer, as noted above.

Harold Bradford Barry, district engineer on the St. Louis-San Francisco, with headquarters at Memphis, Tenn., has been promoted to principal assistant engineer, with headquarters at St. Louis, Mo. Mr. Barry, who was born at Hillsboro, Ill., on May 19, 1880, received his education at the University of Illinois and entered railway service in July, 1902, with the St. Louis, Memphis & Southeastern. From 1903 to 1904, he served as instrumentman on construction on the El Paso & Southwestern in Arizona, leaving this road in the latter year to go to the Southern Pacific as a transitman on location. In 1906 Mr. Barry entered the employ of the St. Louis-San Francisco as a transitman on a maintenance of way party and from 1907 until 1911, served in the capacity of assistant engineer. He was promoted to district engineer on April 15, 1911, which position he held until his promotion to principal assistant engineer as noted above.

Anton Anderson, corporate engineer of the Chicago, Indianapolis & Louisville, with headquarters at Chicago, has been appointed engineer maintenance of way, with headquarters at Lafayette, Ind., as noted in last month's issue. Mr. Anderson was born at Lafayette, Ind., on October 12, 1879, and attended Purdue University. In 1901 he worked in a structural steel shop in St. Louis, Mo., and the following year entered railway service with the Choctaw, Oklahoma & Gulf as a draftsman in the office and field. He went to the Indianapolis Northern Traction Company as office engineer and masonry engineer in January, 1903, and in January of the next year went with the Midland Valley on location work. In August, 1904, Mr. Anderson was appointed city engineer at Lafayette, Ind., remaining in this position until 1906, when he was appointed resident engineer on the Chicago, Indianapolis & Louisville. He served on this road consecutively as resident engineer, engineer of construction, assistant engineer, division engineer and principal assistant engineer until August, 1918, when he was appointed corporate engineer, in which capacity he served until his appointment as stated above.

Galen B. Owen, superintendent of maintenance of the Erie at New York, has been promoted to the chief engineer's staff, with the same headquarters. In the *Railway Maintenance Engineer* for March, page 128, it was incorrectly stated that he had been promoted to the general manager's staff.

William J. Foster, assistant superintendent of construction of the Erie, with headquarters at New York, was promoted to regional engineer of the Hornell region, with headquarters at Hornell, N. Y., as noted in last month's issue. Mr. Foster was born at Honesdale, Pa., in July, 1876, and received his education at the Middletown (N. Y.) Academy. He entered railway service with the Erie in July, 1893, and served consecutively as chainman, rodman, transitman and track supervisor's and master carpenter's clerk, until 1898, when he was appointed engineer in charge of the construction department, under C. W. Buckholz, chief engineer. He became assistant division engineer in 1904 and left the Erie in 1905 to become superintendent of the John H. Parker Company, general building contractors in New York City. Mr. Foster returned to the Erie in 1906 as assistant to the engineer of grade crossings, and from 1908 to 1912 served as resident engineer in charge of construction in the grade crossing department. From the latter date until 1916 he served as district engineer in charge of second track and grade reduction work on the Chicago & Erie division, at which time he was promoted to engineer of grade crossings. In 1918 Mr. Foster was appointed assistant superintendent of construction, which position he held until his promotion as mentioned above.

H. Rettinghouse, chief engineer of the Chicago, St. Paul, Minneapolis & Omaha, with headquarters at St. Paul, Minn., has resigned and will retire from active engineering practice. Mr. Rettinghouse was born in Germany on July 30, 1861. He was educated in that country and came to the United States in 1882, beginning railway service in 1883 as a rodman on construction work on the St. Paul extension of the Wisconsin Central. The following year he became connected with the Chicago & Northwestern, and was successively leveler, instrument man and assistant engineer in charge of location, construction and maintenance. Mr. Rettinghouse was engaged in general engineering business at Ashland, Wis., from 1893 to 1897, including three years served as city engineer of that city. He then returned to the Northwestern and was assistant engineer in charge of construction and maintenance until May, 1900. From the latter date until February, 1905, he was superintendent of bridges and buildings of the Ashland division. He was then division engineer of the Southern division of the Wisconsin Central, resigning in January, 1907, to become division engineer of the Chicago & Northwestern at Boone, Ia., in charge of maintenance. In April, 1912, he was superintendent of the Iowa & Minnesota division at Mason City, Ia., from which position he was promoted to chief engineer of the Chicago, St. Paul, Minneapolis & Omaha.

Walter J. Towne, assistant general manager of the Chicago & North Western, with headquarters at Chicago, has been appointed engineer maintenance of way, with the same headquarters. Mr. Towne was born at Leavenworth, Kan., on November 28, 1867, and entered railway service in 1886 as a rodman in an engineering party on the Atchison, Topeka & Santa Fe. He was later instrument man and assistant engineer on the same road, but left railway service in 1891 to attend Renssalaer Polytechnic Institute, from which he graduated in 1896. He then became assistant engineer on the New York State Canals, which position he held until February 14, 1899, when he returned to railway service as an assistant engineer on construction on the Chicago & North Western, with headquarters at Boone, Iowa. In 1900 he was promoted to assistant engineer at Kaukauna, Wis., and in 1901 was transferred to Escanaba, Mich. In

1902 Mr. Towne was promoted to division engineer with headquarters at Baraboo, Wis., later serving in the same position at Escanaba and Chicago. From March, 1906, to July of that year, he served as engineer of permanent improvements and on the latter date was appointed engineer maintenance of way of the North Western, in which position he continued until April, 1912, when he was appointed general superintendent with headquarters at Chicago. On May 13, 1914, he was promoted to assistant general manager with the same headquarters and remained in this position until his appointment as engineer maintenance of way.

W. J. Bergen, corporate chief engineer of the New York, Chicago & St. Louis, with headquarters at Cleveland, Ohio, has been appointed consulting and valuation engineer, with the same headquarters.

J. S. Lemond, assistant to chief engineer maintenance of way and structures of the Southern, with headquarters at Charlotte, N. C., has been appointed chief engineer maintenance of way and structures, with the same headquarters, succeeding **B. Herman.** Mr. Lemond entered railway service with the Southern in April, 1883, as a section foreman. Since that time he has served this road consecutively as section foreman, work-train conductor, track supervisor, roadmaster, superintendent of track, bridges and buildings and engineer maintenance of way. In June, 1917, he was appointed assistant to the chief engineer maintenance of way and structures, which position he held until his appointment as noted above.

David Meriwether, Jr., assistant to chief engineer of construction of the Southern Railway with office at Washington, D. C., has been appointed regional engineer, Allegheny region, for the Division of Liquidation Claims of the United States Railroad Administration, with office at Philadelphia, Pa. Mr. Meriwether was born at Louisville, Ky., in February, 1879. He is a graduate of Rose Polytechnic Institute. Immediately after graduation he entered the employ of the Pennsylvania Lines as an assistant in the engineering corps of the Cincinnati division. The following year, 1901, he entered the employ of the Southern Railway in the engineering department, serving successively as levelman and transitman. In 1903 he was appointed assistant engineer of construction, from which position he was promoted, in 1918, to assistant to the chief engineer of construction, where he remained until his appointment, as noted above, effective March, 1920.

T. H. Gatlin, assistant to the president of the Southern, with headquarters at Richmond, Va., has been appointed chief engineer of construction, with headquarters at Washington, D. C. Mr. Gatlin was born at Tarboro, N. C., on November 8, 1876, and was educated at Trinity College, Durham, N. C. He entered railway service in the engineering department of the Atlantic Coast Line in May, 1892. From 1899 to 1901 he served as chief engineer of the East Carolina Railway, and from March, 1905, to July, 1906, he was assistant chief engineer in the maintenance of way office, in charge of track work drafting, and later was engineer maintenance of way on the Middle district of the Southern, with headquarters at Knoxville, Tenn. He was appointed assistant chief engineer maintenance of way and structures on the Southern, with headquarters at Washington, D. C., on August 1, 1911, and held this position until January, 1917, when he was made assistant to the vice-president in charge of operation. In August, 1918, he was promoted to assistant to the president, remaining in this position until his appointment as noted above.

C. B. Spencer, district engineer Interstate Commerce Commission, Division of Valuation, at Kansas City, Mo., has been appointed valuation engineer of the St. Louis-San Francisco, with headquarters at St. Louis, Mo., as noted elsewhere. Mr. Spencer was born at Boonville, Ind., on May 22, 1871, and graduated from the University of Missouri in 1893. From 1895 to 1901 he was employed in various positions by the Kansas City, Ft. Scott & Memphis, leaving this road in the latter year to enter the employ of the St. Louis-San Francisco, where he served consecutively as resident engineer, division engineer, district engineer and office engineer until February 1, 1914. On that date he resigned to become senior civil engineer, Division of Valuation, Interstate Commerce Commission, at Kansas City, which position he held until April 1, 1916, when he was promoted to assistant district engineer. In February, 1920, Mr. Spencer was promoted to district engineer, which position he held until his appointment as noted above.

Charles H. Koyl, whose appointment as engineer of water service of the Chicago, Milwaukee & St. Paul, with headquarters at Chicago, was announced in the *Railway Maintenance Engineer* of February, page 80, was born at Amherstburg, Ontario, Canada, on August 14, 1855. He graduated from the Victoria College at Baboury, Ont., in 1877 and attended the Johns Hopkins University as a fellow in physics from 1881 to 1883. He entered railway service in 1904, with the Great Northern as engineer of water service. This position he retained until he was appointed engineer of water service on the Chicago, Milwaukee & St. Paul.

John R. Sexton, division engineer of the Marion and Chicago divisions of the Erie Railroad, with headquarters at Huntington, Ind., has been promoted to regional engineer in charge of the Chicago region, with headquarters at Chicago. Mr. Sexton was born on January 18, 1889, at Long Branch, N. J., and graduated from Rutgers College in 1911, having served previously as a rodman on the Lehigh Valley in the summer of 1909. From August 1, 1911, to October 13, 1913, was employed consecutively on the New York Central as chainman, rodman, instrumentman and inspector. He then entered the service of the Erie as resident engineer, later becoming assistant division engineer of the Mahoning division. In April, 1916, he was promoted to division engineer of the Meadville division, and in May, 1917, was transferred to the Marion and Chicago divisions, where he remained until his recent promotion to regional engineer.

John R. Sexton

F. S. Schwinn, engineer on the valuation committee of the International & Great Northern, with office at Houston, Tex., has been appointed chief engineer, with the same headquarters. Mr. Schwinn was born in 1889 and received his technical education at the Lewis and Armour Institutes of Technology, Chicago. He entered railway service in 1907 as a rodman on the Chicago & Alton, at Joliet, Ill. The following year he was appointed a rodman on the Southern Pacific, with headquarters at Sacramento, Cal., and consecutively to 1913 was draftsman, instrument man and assistant engineer. In the latter year he was transferred to the Louisiana lines, as assistant engineer, with headquarters at Lafayette, La. In 1914 he was appointed assistant superintendent in charge of maintenance of those lines and in 1917 was appointed assistant superintendent of the Gulf division of the International & Great Northern, with headquarters at Palestine, Tex. The following year he was appointed engineer on the valuation committee, which position he retained until his recent appointment.

M. Stringfellow, district engineer in charge of double track construction on the Southern Railway, with headquarters at Charlotte, N. C., has been appointed regional engineer of the Southwestern region for the Division of Liquidation Claims of the United States Railroad Administration, with office at St. Louis, Mo. Mr. Stringfellow graduated from the University of the South in 1903, and entered the employ of the Southern Railway as levelman on railway location, remaining in the continuous employ of that company until September, 1913, when for a short time he was general superintendent for a contractor, returning to railway service in January, 1914, as field engineer in the valuation depart-

ment of the Atlanta, Birmingham & Atlantic. In April of that year he returned to the Southern as assistant engineer on double track construction. In November, 1917, he was promoted to the position of district engineer in charge of double track construction on the Cincinnati, New Orleans & Texas Pacific. In January, 1918, he entered the United States Army, receiving a commission as captain of engineers. Upon his discharge from the army he returned to the Southern as district engineer in charge of double track construction from Washington, D. C., to Central, S. C., in which position he remained until his recent appointment as regional engineer, which was effective March 1, 1920.

William N. Boyd, corporate engineer of the Port Huron & Detroit, has been appointed chief engineer of the Detroit, Bay City & Western, with headquarters at Bay City, Mich. Mr. Boyd was born at Johnstown, Pa., on January 26, 1889. He has served as chief engineer of the Detroit, Bay City & Western since commencement of construction in 1909, with the exception of the two years of government control, during which period he was retained to look after the corporate interests and the construction of the Port Huron and Detroit, this being the position he held at the time of his recent appointment.

TRACK

D. G. Smith has been appointed acting roadmaster of the Piedmont & Northern, with headquarters at Greenville, S. C., succeeding **B. N. Richburg.**

Gus Gullickson, roadmaster on the Yellowstone division of the Northern Pacific, with headquarters at Forsyth, Mont., was granted a leave of absence on account of sickness, effective March 8.

James Glynn has been appointed assistant roadmaster on the Chicago, Milwaukee & St. Paul, with headquarters at the Milwaukee Terminal, succeeding **C. Hanson,** assigned to other duties. **A. H. Hobert,** roadmaster on the Western Division of the Kansas City Division, with headquarters at Chillicothe, Mo., has been granted a leave of absence. As a consequence, **William Metcalf** and **R. H. Cunningham,** roadmasters, with headquarters at Ottumwa Junction, Ia., have had their jurisdictions extended, and **F. M. Barnoske,** roadmaster, with headquarters at Washington, Ia., has been transferred to the Middle division with headquarters at Ottumwa Junction, Ia.

Thomas Lynch, who has been promoted to roadmaster on the Buffalo, Rochester & Pittsburgh, with office at Du Bois, Pa., was born in Ireland on March 16, 1868, and was educated in the common schools there. He began railway work in 1889 as a laborer with the Buffalo, Rochester & Pittsburgh, in which employ he has since remained, continuously. In 1895 he was made section foreman at Du Bois, Pa., being promoted to extra gang foreman in 1904 and in 1916 he was promoted to general foreman at the same place. In April, 1919, he was made acting roadmaster of the Third division at Du Bois, and on March 15, 1920, he was promoted to roadmaster of the same division, as noted above.

Jacob J. Kostielney, assistant roadmaster of the Detroit Terminal division of the Michigan Central, has been promoted to roadmaster, with headquarters at West Detroit, Mich., succeeding **William Hazelwood,** deceased. Mr. Kostielney was born at Churubusco, Ind., on July 13, 1885, and entered the employ of the Wabash in November, 1902, as a section laborer. He left the Wabash in July, 1905, to become a section hand on the Michigan Central, in which capacity he served until June, 1906, when he worked with a bridge gang. He was promoted to assistant extra gang foreman in May, 1907, and to extra gang foreman in 1910. Mr. Kostielney was promoted to construction foreman in April, 1913, and on February 11, 1914, was promoted to assistant roadmaster on the East division. He was transferred to the Detroit Terminal on December 8, 1918, remaining in this position until his promotion as noted above.

BRIDGES AND BUILDINGS

D. N. Neal, office engineer of the Western Pacific with headquarters at San Francisco, Cal., has been promoted to bridge engineer, with the same headquarters.

J. A. Lindstrand, senior architect of the Bureau of Valuation, Illinois Interstate Commerce Commission, with headquarters at Chicago, has resigned to engage in private practice as an architect in Chicago.

J. E. Buckley, supervisor bridges and buildings of the Boston & Maine at Nashua, N. H., has been transferred to Fitchburg, Mass. **T. W. Sughrue** has been appointed supervisor bridges and buildings on the W. N. & P. division, with headquarters at Nashua, N. H., succeeding Mr. Buckley. **A. I. Gauthier** has been appointed supervisor bridges and buildings at Concord, N. H., succeeding **S. E. Dufort. E. B. Piper** has been appointed supervisor bridges and buildings of the Berkshire division, with headquarters at North Adams, Mass., succeeding **A. W. Savage. S. P. Coffin** has been appointed supervisor bridges and buildings, Terminal division, Boston, succeeding **A. S. DeLoria.**

Edwin B. Piper, who has been appointed supervisor of bridges and buildings on the Boston & Maine, with headquarters at North Adams, Mass., was born at Malden, Mass., on July 22, 1891. He graduated from Valparaiso University in 1912, and for two years following was employed by the American Company at Chicago. In 1914 he entered the service of the Boston & Maine as division foreman in the bridge and building department on the Fitchburg division, wth headquarters at Fitchburg, Mass. In July, 1917, he went to France with the A. E. F. as master engineer, 14th Engineers (Railway), and later was commissioned First Lieutenant in the 315th Engineers, 90th Division. Upon his discharge from the United States Army in June, 1919, he returned to the Boston & Maine and has now been appointed supervisor of bridges and buildings of the Berkshire division, as noted above.

Pusey Jones, acting engineer of structures of the Boston & Maine, has been promoted to bridge engineer of that road with headquarters at Boston, Mass. He was born at Wilmington, Del., in July, 1880, and graduated from Delaware State College in 1902, when he entered the employ of the Philadelphia, Baltimore & Washington. Mr. Jones remained with this road until April, 1903, when he left railroad service to engage in industrial work for two years. In 1905 he took a position with the New York, Westchester & Boston as structural draftsman, and in 1910 was made assistant structural engineer. From July, 1912, to April, 1914, he was with the Georgia Coast & Piedmont, first as principal assistant engineer at Brunswick, Ga., and later as chief engineer on the design and construction of several bridges and buildings. In 1914 he engaged in private practice in Savannah, and in 1916 went with the Boston & Maine as chief draftsman. During the war he was appointed acting engineer of structures, from which position he was promoted to bridge engineer as mentioned above.

Samuel Prescott Coffin, who has been appointed supervisor of bridges and buildings of the Boston & Maine, with headquarters at Boston, Mass., as noted elsewhere, was born in July, 1883, at West Newbury, Mass. He was educated in the Newburyport high school, and later studied under the direction of the International Correspondence School and the Boston Y. M. C. A. In November, 1901, he entered the employ of the Boston & Maine as rodman, subsequently serving as transitman from 1903 to 1907. He was an assistant engineer on construction from 1907 to 1911, an assistant engineer in charge from 1911 to 1915, and supervisor bridges and buildings at Boston, Mass., from 1915 to April, 1918, when he enlisted in the Railway Transportation Corps. He received a commission as first lieutenant and served in France for fourteen months. In December, 1918, he was detailed to the Inter-Allied Railway Commission, with headquarters at Coblenz, Germany, as maintenance engineer, being recommended for captaincy on April 19, 1919. In August, 1919, he returned to the United States and upon his discharge from the United States Army returned to the Boston & Maine as supervisor of bridges and buildings in charge of maintenance of bridges, buildings and other structures on the Terminal division, with headquarters at Boston, Mass.

PURCHASING AND STORES

E. W. Peterson has been appointed general storekeeper of the Bangor & Aroostock.

Robert B. Pegram, general purchasing agent for the Southern, has become vice-president, with headquarters at Atlanta, Ga.

C. S. Marshall has been appointed general storekeeper of the St. Louis Southwestern, with headquarters at Tyler, Tex.

R. T. Pace has been made purchasing agent of the Atlanta & West Point, the Western Railway of Alabama and the Georgia Railroad, with headquarters at Atlanta, Ga., succeeding **F. K. Mays.**

C. S. White, purchasing agent of the Pittsburgh & Lake Erie, at Pittsburgh, has been made purchasing agent of the New Yoirk Central, with headquarters at New York.

H. O. Hoffman has been appointed purchasing agent of the Mississippi Central, with headquarters at Hattiesburg, Miss., succeeding **H. DeCamp.**

L. M. Sullivan, chief clerk to the federal manager of the Texas & Pacific, has been appointed purchasing agent, with headquarters at Dallas, Tex., succeeding **C. B. Porter,** acting purchasing agent.

W. R. Shrodes has been appointed purchasing agent of the Quincy, Omaha & Kansas City, with headquarters at Kansas City, Mo., succeeding **L. N. Hopkins.**

W. E. Hodges, vice-president in charge of purchases of the Atchison, Topeka & Santa Fe, with headquarters at Chicago, has been appointed vice-president with headquarters at Los Angeles, Cal.

A. T. Watson has been reappointed general purchasing agent of the Cumberland & Pennsylvania, with headquarters at Fairmont, W. Va., this being the position he held prior to government control.

A. L. Cochrane has been appointed purchasing agent of the Denver & Salt Lake, with headquarters at Denver, Colo., succeeding **W. C. Weldon.** Mr. Cochrane was general storekeeper of the Denver & Salt Lake prior to government control.

H. Greenfield has been reappointed to the position of purchasing agent of the Duluth, Missabe & Northern, with headquarters at Duluth, Minn., succeeding **Ralph P. Moore,** this being the position he held prior to government control.

J. L. Cowan has been appointed purchasing agent of the San Antonio & Aransas Pass, with headquarters at San Antonio, Tex., succeeding **N. P. Randolph,** this being the position he held prior to government control.

F. W. Mahl, corporate mechanical engineer of the Southern Pacific, with headquarters at San Francisco, Cal., has been appointed director of purchases, with headquarters at New York.

E. T. Irving has been appointed tie and timber agent of the St. Louis Southwestern Lines, with headquarters at Texarkana, Tex., succeednig **E. E. Grubb. C. C. Marshall** has been appointed general storekeeper, with headquarters at Tyler, Tex., succeeding **J. M. Doolittle.**

T. O. Wood has been appointed purchasing agent of the Gulf, Colorado & Santa Fe, with headquarters at Cleburne, Tex., succeeding **C. B. Porter. E. S. Newton** has been appointed storekeeper, with headquarters at Cleburne, succeeding **C. J. Irwin.**

W. A. Starritt, who was purchasing agent of the Carolina, Clinchfield & Ohio, with headquarters at Johnson City, Tenn., previous to government control, has been reappointed to that position upon the relinquishment of management by the Southern Railway.

C. R. Craig has been appointed general purchasing agent of the Southern, with headquarters at Washington, D. C., succeeding **R. B. Pegram. L. H. Skinner** has been appointed purchasing agent, wth headquarters at Washington, D. C. **A. Telford,** local purchasing agent, with headquarters at Cincinnati, Ohio, has been appointed assistant general purchasing agent, with headquarters at Washington.

M. E. Towner, manager, Forest Products Section of the United States Railroad Administration, with headquarters at Washington, has been appointed general purchasing agent of the Western Maryland, with headquarters at Baltimore, Md., succeeding **W. S. Galloway,** this being the position held by Mr. Towner prior to government control. **R. R. Kane** has been appointed general storekeeper, with headquarters at Hagerstown, Md., succeeding **D. Kavanagh.**

OBITUARY

W. R. Shoop, manager of purchasing and stores of the Buffalo, Rochester & Pittsburgh, with headquarters in Rochester, N. Y., died recently at his home in Rochester.

J. S. Berry, superintendent of bridges and buildings of the St. Louis Southwestern, with headquarters at Tyler, Tex., died at Fort Worth on February 9. Mr. Berry had been in the service of this road for more than 25 years.

William Hazelwood, roadmaster on the Michigan Central, died February 24 at his home in Detroit, Mich. Mr. Hazelwood entered the service of the Michigan Central on May 1, 1889, as a section laborer and was promoted to foreman on December 1, 1894, later being promoted to extra gang foreman. On May 1, 1903, he was appointed assistant roadmaster on the main line between Detroit and Jackson and on June 1, 1904, he was promoted to roadmaster at Detroit, which position he held at the time of his death.

J. A. Atwood, chief engineer of the Pittsburgh & Lake Erie and the Monongahela, with headquarters at Pittsburgh, Pa., died at his home in that city on February 29. Mr. Atwood was born at Chatham, Mass., on February 8, 1857. He graduated from the New York University in 1878 and entered railway service in the same year as a transitman on the New York Elevated Railroad. In March, 1879, he was appointed a rodman and later a leveler on the Elizabeth City & Northwest. In 1880 he was appointed a draftsman on the New York, Lake Shore & Buffalo, serving in that position until 1883, when he was appointed assistant to the chief engineer of the Tenth Avenue Cable Railway in New York City. From 1885 to 1887 he was resident engineer of the Chautauqua Lake, and from the latter date until 1889 assistant engineer on the Lake Shore & Michigan Southern. In 1889 he was appointed engineer of construction on the Pittsburgh & Lake Erie, retaining that position until 1896, when he was appointed chief engineer. Mr. Atwood was second vice-president of the American Railway Engineering Association at the time of his death.

J. A. Atwood

Alexander M. Lupfer, chief engineer of the Spokane, Portland & Seattle, died recently at his home in Portland, Ore. Mr. Lupfer was born in Blaine, Pa., in 1855. He graduated from Lafayette College, Easton, Pa., in 1880 and shortly after entered railway service on the New York, West Shore & Buffalo, now a part of the New York Central. He later became connected with the Denver & Rio Grande, on which he served until 1883. In 1884 he was appointed assistant engineer of the Oregon Railroad & Navigation Company, with headquarters at Portland, Ore., and later in the same year entered the employ of the Northern Pacific in the same capacity. In June, 1885, he returned to Portland to engage in private engineering practice. Soon after, however, he was appointed resident engineer of the Chicago, St. Paul & Kansas City (now the Chicago Great Western), also of the Illinois Central, the Denver & Rio Grande and the Union Pacific, and served in that capacity until 1890, from which time until 1905 he was reconnaisance and location engineer of the Great again became affiliated with the Great Northern. On Jan-

Northern. From 1905 until 1911 Mr. Lupfer was chief engineer of the Spokane & Inland Empire, with headquarters at Spokane, Wash. In 1911 he went to Brazil in the interest of mining properties and proposed railroads. During part of 1912 he was associated with John Stevens, who had been engaged to undertake the reconstruction of the railway system in Spain. Returning to America later in the same year, he uary 1, 1913, he returned to the Spokane, Portland & Seattle as chief engineer and also served in the same capacity for the Portland & Seattle, the Spokane & Inland Empire and the Oregon Trunk.

George Barker Burbank, civil and consulting engineer, died of pneumonia on February 29, in his home in New York City, at the age of 75. He was born in Kentucky and educated in Ludlow, Vt. After Mr. Burbank's service in the Civil War, he engaged in railroad work and directed construction of a section of the Baltimore & Ohio R. R. in West Virginia, later having charge of the construction of the Denver & Rio Grande R. R., as well as engaging in mining work in Nevada. From 1890 to 1892 he was chief engineer of the Cataract Construction Company of Niagara Falls, and was at one time general manager of the United Comstock Association of Nevada and interested for years in railroad work in Alaska. He recently was employed by New York City as an engineer on the Ashokan aqueduct.

Harry T. Ruhl, engineer maintenance of way and structures of the Delaware & Hudson, with headquarters at Albany, N. Y., died at his home in that city on February 18. Mr. Ruhl was born in Buffalo Cross Roads, Pa., September, 1882, and received his education in Bucknell University, graduating in 1905. He then entered the engineering department of the Canadian Pacific as transitman on the location and construction of the La Belle branch. He was transferred to the Toronto-Sudbury branch in 1907, where he served as engineer in charge of construction until the completion of that line. In 1909 he became interested in maintenance work and was appointed senior transitman on District No. 1 of the Lake Superior division. He was made resident engineer on District No. 2 of Lake Superior division, with headquarters at Sudbury, Ont., six months later and in 1911 he was appointed resident engineer on District No. 2 of the Eastern division, with headquarters at Farnham, Que. In 1914 he went to the Canadian Government Railways as resident engineer at New Glasgow, N. S., and in 1916 he was promoted to division engineer, with headquarters at Moncton, N. B. He held this position until June, 1917, when he was appointed engineer maintenance of way and structures for the Delaware & Hudson, with headquarters at Albany.

Frederick T. Hatch, consulting engineer of the Pennsylvania Lines in charge of valuation matters, with headquarters at St. Louis, Mo., and formerly chief engineer maintenance of way, Lines West, St. Louis system, died suddenly at his home in St. Louis on March 9 at the age of 64. Mr. Hatch was born at Haverhill, Mass., and received his education at Phillips Academy, Andover, Mass. He entered railway service in 1874 with the Boston Hoosac Tunnel & Western as rodman on construction from Greenfield, Mass., to Hoosac Tunnel. From 1880 to 1888 he served on the maintenance of way engineering corps of the Pittsburgh, Cincinnati, Chicago & St. Louis (then Pittsburgh, Cincinnati & St. Louis), in the latter year being promoted to engineer maintenance of way of the Indianapolis division. In 1890 he was transferred to the Pittsburgh division as engineer maintenance of way. Mr. Hatch was appointed superintendent of the Michigan division of the Terre Haute & Indianapolis (Vandalia Line) in April, 1894, in which capacity he served until March, 1903, when he was transferred to the Peoria division. He also served as chief engineer of this line from 1896 to 1902 and as superintendent Logansport & Toledo division from December, 1901, to March, 1903. On January 1, 1905, he was again appointed chief engineer of the Vandalia, and when that road was absorbed by the Pennsylvania in February, 1917, was appointed chief engineer maintenance of way of the Pennsylvania Lines, St. Louis system, with headquarters at St. Louis, Mo. He retained this position until August, 1918, when he was appointed consulting engineer in charge of valuation matters, which position he held at the time of his death.

CONSTRUCTION NEWS

The Cincinnati, New Orleans & Texas Pacific will receive bids for the renewal of the superstructure of the bridge over the Ohio river at Cincinnati on April 1. The old single-track superstructure is to be replaced by a new superstructure for double track. The grade of the track is to be raised four feet. No change is to be made in the substructure except as is necessary to provide for the new trusses and the change in grade. The new superstructure will consist of simple spans of varying length up to a maximum of 514 ft., but the cantilever method of erection will be used as the plan of reconstruction does not permit of the use of falsework in the river. About 14,000 tons of steel will be required. The bids will be received by Ralph Modjeski, consulting engineer, Chicago.

The DeQueen & Eastern and the Texas, Oklahoma & Eastern are extending their lines between DeQueen, Ark., and Broken Bow, Okla., to form a connection midway between the two cities and it is expected that construction will be completed the latter part of this year.

The Erie contemplates building a 180-ft., single-leaf, double-track bridge over the Passaic river at Newark, N. J., for which plans and specifications are being prepared by the Strauss Bascule Bridge Company, Chicago.

The Illinois Central on March 21 began active construction work on the new Markham switching yards, located between Harvey, Ill., and Homewood, near Chicago.

The New York Central has let contracts for building 13 additional stories on its mail and express building between Forty-fifth and Forty-sixth streets on Lexington avenue, New York, as follows: To the Phoenix Bridge Company, for furnishing steel; to the Terry & Tench Company, Inc., for erecting the steel, and to James Stewart & Co., Inc., for the general construction of the building exclusive of the steel. It is expected that the steel will arrive in June and that construction of the building will then be started; and that it will be completed early in 1921.

The Philadelphia & Reading has awarded a contract to the Smith-McCormick Company, Easton, Pa., for the construction of a new double-track concrete arch bridge about 3,500 ft. long, consisting of 46 arches, over the Susquehanna River, at Harrisburg, Pa., to replace the existing single-track deck-truss bridge.

The J. W. Wells Lumber Company, Menominee, Mich., will begin the construction of a logging railroad from a point on the main line of the Chicago, Milwaukee & St. Paul midway between Sagola, Mich., and Carey, and extending 11 miles toward Metropolitan, Mich., as soon as the weather permits. The company is dismantling its old logging railroad in Marinette County.

IRON AND STEEL

The Boston & Albany is in the market for 255 tons of fabricated steel.

The Boston & Maine is in the market for 1,100 tons of fabricated steel.

The Cleveland, Cincinnati, Chicago & St. Louis has placed orders for an aggregate of 30,000 tons of rail.

The Delaware, Lackawanna & Western has ordered 1,000 tons of fabricated steel for bridge and station repairs and renewals.

The New York, Chicago & St. Louis R. R., which has been inquiring for 10,000 tons of rail additional, will be furnished 25,000 tons of this amount by Steel Corporation Mills and an independent company will probably roll the remaining 7,500 tons.

The South Manchurian Railway is inquiring for 10,000 tons of 100-lb. rails.

The United Fruit Company has ordered 1,400 tons of 60-lb. rails for export to Cuba.

FOREIGN RAILWAY NEWS

A party of 50 French railway experts from Paris is now in Greece to undertake supervision of the organization of the Greek railways, which are to be considerably extended after the Treaty of Versailles comes into effect.

An eastern extension of the Finnish railways is planned from Sordavala to Salonis, by the north coast of Lake Ladoga to the Russian border, eventually connecting with the Murman line.

An elaborate plan for the electrification of the Central Railway of Brazil has been presented to the federal government of Brazil by an Anglo-Italian syndicate. A French syndicate has already proposed a similar project to the administration, so that the granting of the concession will depend upon the terms offered. It is believed that the government engineers are in favor of the French offer being accepted.

Among the Chilean railway projects are a new railroad from Collipulo to La Esperanza, which is estimated to cost 32,000 pesos; a railway from Santiago to Valparaiso via Casablanca, for which 80,000 pesos have been appropriated to complete the necessary surveys, and a railroad from Nocopulli to Dalcafrue. In addition, the government plans to electrify the line from Valparaiso to Santiago.

The Chilean government and a Chilean-Ecuadorian syndicate are contracting for the building of a railroad from Porto Bolivar, Ecuador, east into Brazil, to afford an outlet for a rich but heretofore inaccessible territory. The road, which will extend to Para on the Amazon, a distance of approximately 563 mi., will cost about $30,000,000.

Work on the construction of the Chuquicara Railway of Peru was started in July, 1919. This new road, which is a branch of the Chimbote Railway, will leave that road at kilometer 75 and extend in a northerly direction up the valley of the Chuquicara river for a distance of 15½ mi. to the coal fields of Ancos. When completed this line will pass within approximately 18.6 mi. of the Magistral copper district, through the town of Santiago de Chuco, within 6.2 mi. of the Chimborazo copper deposits, and through the towns of Huamachuco and Cajabamba.

A Deputation of the Channel Tunnel Committee of the House of Commons recently called upon the Prime Minister of England in order to expedite a decision respecting the construction of a tunnel under the English channel. Attention was called to the fact that the time necessary for completion would be five years and the total cost would be $155,728,000, or double the pre-war estimate, and that no serious engineering difficulties were anticipated. It was also reported that there was great enthusiasm for the plan in France. In replying, the Prime Minister stated that the plan would be carefully examined from the engineering, military, naval and air points of view, and "if the military advice is favorable the ministry will certainly be prepared to support the plan on general grounds."

A railroad outlet has been planned through the Rio Grande border town of Ojinaga, a town which has figured prominently in revolutionary affairs of Mexico during the last several years. The construction of a railroad from Juarez to Ojinaga, 250 mi. long, has been authorized by the Department of Communications and Public Works of Mexico and the survey for this line has been ordered. The primary purpose of this road, whose route will follow closely the course of the Rio Grande, is to provide a means for the quick transportation of troops and supplies in case of border disturbances. Plans for the ultimate extension of the line from Ojinaga southeast to a connection with the Eagle Pass-Torreon division of the National Railways of Mexico, a distance of approximately 400 mi. long, also have been proposed. The cost of building the road from Juarez to Ojinaga will be borne jointly by the federal government and the Chihuahua state government.

SUPPLY TRADE NEWS

GENERAL

The Algoma Steel Corporation, Sault Ste. Marie, Ont., is purchasing equipment for its new combined rail and structural mill which it is erecting at Sault Ste. Marie. The principal buildings will be of structural steel construction with corrugated iron covering.

The Morse Chain Company, Ithaca, N. Y., has opened two additional branch offices, one at 1402 Lexington building, Baltimore, Md., in charge of **E. R. Morse,** and the other at 302 Harrison building, Philadelphia, Pa., with **M. H. Rodda** as manager.

The Barrett Company, 17 Battery place, New York, is having plans made for putting up a 16-story office building at Rector and West streets. Warren & Wetmore, New York, are the architects. The general contract has been let to the George A. Fuller Company, New York.

The Buffalo Forge Company, Buffalo, N. Y., held a recent meeting of stockholders at which the following new officers were elected: **Henry W. Wendt,** president; **Edgar F. Wendt,** vice-president and treasurer; **Henry W. Wendt, Jr.,** vice-president and secretary; **C. A. Booth,** vice-president and sales manager. The new directors include the above named officers and in addition **H. S. Whiting.**

The American Steam Conveyor Corporation, Chicago, has made arrangements with the Wellman Bibby Company, Ltd., 36 Kingsway, London, W. C. 2, England, to act as its representative in Great Britain and Ireland for the sale of the American steam ash conveyor. The Wellman Bibby Company intends to manufacture the American steam ash conveyor in England.

The American Chain Company, Bridgeport, Conn., recently purchased the control of the Page Steel & Wire Company, with mills at Monessen, Pa., and Adrian, Mich. The business will be continued as heretofore. The new officers elected under the reorganization of the company are: **Walter B. Lashar,** president; **William T. Morris,** vice-president; **Wilmot F. Wheeler,** treasurer; **John E. Carr,** assistant treasurer, and **William M. Wheeler,** secretary. **E. C. Sattley,** general manager of the Page Steel & Wire Company, will continue in that capacity with office in Pittsburgh, Pa.

The American Steam Conveyor Corporation, Chicago, has appointed the **Kon-Wald Engineering Company,** Mutual Life building, Buffalo, N. Y., as its representative in Buffalo and western New York. **F. A. Konzelman** is manager of that company. **The Brooks-Fisher Company,** Chandler building, Atlanta, Ga., has been appointed southeastern representative. This company was organized early last summer to carry on a business of manufacturers, agents and contractors. **J. M. Fisher** was for 15 years in the erection department of the Babcock & Wilcox Company, the last six years as district superintendent for the Atlanta territory, and **E. A. Brooks,** the other member of the firm, was, up to the time of the organization of the firm, assistant sales manager for the Atlanta office of the Babcock & Wilcox Company.

Westinghouse, Church, Kerr & Co., New York, has been merged with **Dwight P. Robinson & Co., Inc.,** and it is planned to form a new corporation, probably under the Virginia law, which will be called Dwight P. Robinson & Co., Inc., or a similar name. Dwight P. Robinson has been elected president of the Westinghouse, Church, Kerr & Co., pending final completion of the merger and organization of the new company, and General Guy E. Tripp, now chairman of the board, remains chairman pending completion of the merger. A circular has been issued to the stockholders of the Westinghouse, Church, Kerr & Co., soliciting their approval of the new organization, and the committee appointed to work out the plan has declared it operative.

PERSONAL

W. S. Atkinson, purchasing agent for the Kansas City Southern, with headquarters at Kansas City, Mo., has been appointed manager of the railway sales department of the Cook Paint & Varnish Company, Kansas City, Mo.

J. F. Kroske, who served as a lieutenant with the Nineteenth Engineers during the war, has taken a position in the service department of the Ingersoll-Rand Company, New York, and is connected with its Pittsburgh office.

James J. Flannery, widely known in industrial and financial circles and organizer of the American Vanadium Company, died suddenly at his home in Pittsburgh on March 6 at the age of 66.

Frank C. Smink, formerly for 17 years president of the Reading Iron Company, Reading, Pa., died on March 3 at his home in Reading, at the age of 74. Mr. Smink's early training was received with the Philadelphia & Reading and in Reading banking circles. In 1878 he entered the service of the Reading Iron Works as business manager. When the Reading Iron Company was organized in 1889, he was appointed treasurer and subsequently served as vice-president and general manager. He succeeded the late George F. Baer as president in 1902. Mr. Smink was also a director of the Reading Trust Company and the Temple Iron Company, and for many years served as a member of the executive committee and a director of the Pennsylvania Steel Company, the Spanish-American Iron Company, the Maryland Steel Company, the Penn-Mary Coal Company, the Pure Oil Company, and other organizations.

Frank C. Smink

B. G. Koether has been appointed vice-president of the Hyatt Roller Bearing Company, in entire charge of the company's sales and advertising departments. Mr. Koether is at present located at Detroit, but will leave in a short time for Harrison, N. J., to establish headquarters and take up his new duties. He entered the employ of the Hyatt Roller Bearing Company 18 years ago as accountant, and in a short time was promoted to the position of purchasing agent. He was later made assistant sales manager at Harrison, N. J., and in 1910 went to Detroit to assume the duties of sales manager. Later he became head of the motor bearings division, and for several years has been a director of the company. Mr. Koether is a member of the Detroit Board of Commerce, Players Club, and the Detroit section of the Society of Automotive Engineers.

L. G. Stowell, an assistant engineer in the engineering department of the Chicago, Milwaukee & St. Paul, with headquarters at Chicago, resigned recently to become sales engineer of the Carter Bloxonend Flooring Company, Kansas City, Mo., and the Marsh & Truman Lumber Company, Chicago, with headquarters in the latter city.

Fred W. Snow, president of the Ramapo Iron Works, Hillburn, N. Y., died on March 26 in that city, at the age of 66 years. Mr. Snow was born on September 12, 1853, and after completing his education he became connected with the erecting department of the Rhode Island Locomotive Works. When the Ramapo Iron Works was organized in 1881, he became superintendent and a few years later was promoted to general manager. In 1903 he was elected president, in which capacity he served until his death. He was also treasurer of the Canadian Ramapo Iron Works, Ltd., Niagara Falls, Ont., Canada, a director of the American Brake Shoe & Foundry Company, and was interested in other industrial concerns.

Charles A. Beider, assistant manager of sales of the National Malleable Castings Company, Cleveland, Ohio, died in that city on March 13, at the age of 35 years.

W. W. Williams, general manager of the Reading Iron Company, Reading, Pa., has been elected vice-president in charge of sales and operation, and **J. M. Callen,** second vice-president, has been elected vice-president in charge of purchases and distribution of materials. The other officers re-elected at the annual meeting are: **L. E. Thomas,** president; **G. W. Delaney,** secretary; **H. E. Yost,** treasurer; **R. J. Wenger,** assistant treasurer.

George E. Rex, manager of treating plants of the Atchison, Topeka & Santa Fe at Topeka, Kan., resigned, effective April 1, to become vice-president of the National Lumber & Creosoting Company, Texarkana, Tex., with headquarters at Kansas City, Mo. Mr. Rex was born at Kahoka, Mo., on September 6, 1876. He graduated from the Iowa Wesleyan College, Mt. Pleasant, Ia., in 1898, and entered railway service in the same year as a chainman on the Atchison, Topeka & Santa Fe. The following two years he was successively rodman and office engineer, and in September, 1900, was promoted to transitman. He was made building supervisor at Topeka in 1901, a position he held until May, 1903, when he was advanced to division engineer of the Kansas City division with headquarters at Kansas City, Mo. In January, 1906, he was made engineer of construction on a new elevator at Chicago. In November, 1906, he was promoted to assistant manager of the tie and timber department, with office at Topeka, a position he held until 1909, when he was promoted to manager of treating plants, Santa Fe System. He continued in this capacity until his recent election as vice-president of the National Lumber & Creosoting Company. Mr. Rex has been an influential member of the American Wood Preservers' Association, having been the tenth president of that organization.

TRADE PUBLICATIONS

Simplex Track Jack.—Templeton, Kenly & Co., Ltd., Chicago, has issued a folder illustrating and describing the use of square sockets on the Simplex track jack designed for the use of a standard lining pinch or crowbar as the jack handle. The advantage of the steel bar over the ordinary wooden jack lever is explained at some length.

The Pratt Ballast Cleaner.—The Link Belt Company, Chicago, has recently issued a four-page illustrated folder containing a description of the Pratt ballast cleaner. The illustrations show the ballast cleaner in operaion and the text of the bulletin describes the principle of the machine and its operation, including some statistical data on its capacity in cubic feet of ballast per day.

The Jordan Spreader.—This machine is described in a new 24-page bulletin issued by the O. F. Jordan Company, East Chicago, Ind. A series of photographs with explanatory captions demonstrate the various features of this machine and its application to different classes of work. Some of the photographs show the machine in operation as a ditcher, spreader, plow, etc.

The Union Pacific has ordered three American ditchers from the American Hoist & Derrick Company, St. Paul, Minn.

The Plumb Plan League has announced the establishment at its Washington office of a research bureau under the direction of O. S. Beyer, Jr. One of the important functions of the bureau will be the keeping of accurate records of all members of Congress for the benefit of their constituents. The speeches, attitudes and votes of senators and representatives will be carefully indexed and recorded so that a complete record may be had of any member of Congress.